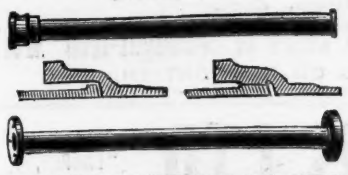
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIII. No. 1875.] LONDON, APRIL 18, 1899. [51ST YEAR. PRICE 6d.

GAS AND WATER PIPES

1¼ to 12 IN. BORE.



THOMAS ALLAN & SONS,

Bonlea Foundry,

SOUTH STOCKTON-ON-TEES.

Formerly Springbank Iron-Works, Glasgow.

ESTABLISHED 1848.

ALSO MANUFACTURERS OF

SANITARY & RAIN-WATER PIPES, HOT WATER PIPES STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.

Telegrams: "BONLEA, STOCKTON-ON-TEES."

INCANDESCENT MANTLES

(Pure White Light).

THE BEST AND CHEAPEST IN THE WORLD

Are Manufactured by

OBERFELT & CO.,

CHARLOTTENSTR., 82, BERLIN.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas. Above the Average in Weight and Quality of Coke.

Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,

CHESTERFIELD.

PARKER & LESTER,

Manufacturers & Contractors.

GAS-LEAK INDICATOR.

For Particulars and Price apply to

ORMSIDE STREET, LONDON, S.E.

ESTABLISHED 1830.

ROBERT MARSHALL;

CANNEL COAL MERCHANT,

97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

CARLESS, CAPEL & LEONARD,

HOPE CHEMICAL WORKS, HACKNEY WICK, LONDON, N.E.,

And at Pharos Works, Hackney Wick.

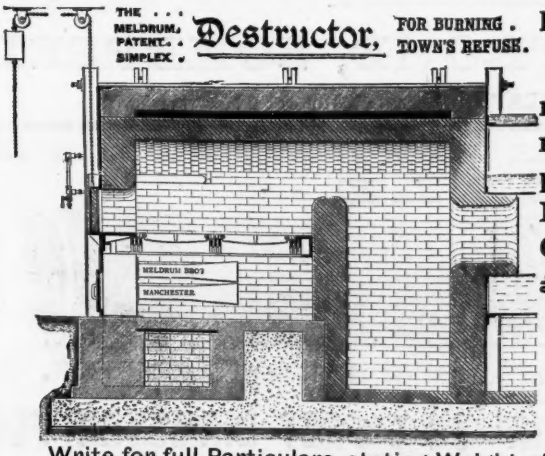
NAPHTHA AND GASOLINE DISTILLERS AND PETROLEUM IMPORTERS,

Specially distil Carburine Spirit, specific gravity ·680, or of any other grade suitable for Enriching Gas; also Gas Oil best adapted for injecting into the Retorts, as in the Herring Process.

Importers of Petroleum for Carburetting Water Gas, or for Manufacturing Oil Gas. Distillers of Pentane, Petroleum Ether, and Naphtha for clearing the pipes of Naphthaline, &c.

Samples and Prices may be had on application.

THE Utilization of Towns' Refuse for some practical purpose has been successfully solved; and there is, therefore, no reason why every township should not have its own Electric Light Installation, and obtain all the power from its Dust-Bins.



At Hereford City the Sewage Farm is now worked entirely with power from refuse, 1¼ million gallons being pumped per day, besides Sludge-Presses, Sludge-Pumps, and Lime-Mixers—the saving in Cost of Coal (not now used) being about £300 per annum.

AN INSTALLATION ON SIMILAR LINES NOW ON ORDER FOR HUNSTANTON WATER-WORKS.

Write for full Particulars, stating Weight of Refuse per annum, and for what purpose you would wish to use the Power, when we shall be glad to submit a suitable Scheme.

MELDRUM BROS., ATLANTIC WORKS, **MANCHESTER.**

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER & BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM

(ESTABLISHED 1765).

MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

Telegrams: "COCKEYS, FROME."

EDWARD COCKEY & SONS, LTD.,

Telegrams: "DAMPER, LONDON."

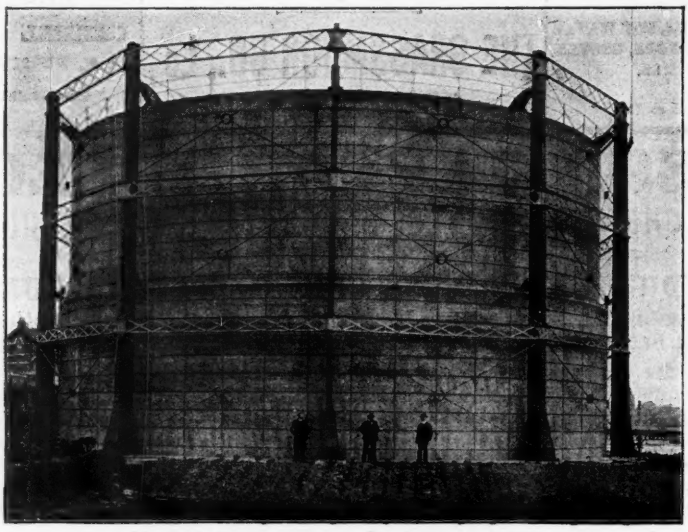
GASHOLDERS IN EITHER STEEL OR WROUGHT IRON.

GASHOLDER TANKS IN STEEL, WROUGHT OR CAST IRON.

CAST-IRON COLUMNS.

STEEL or WROUGHT IRON STANDARDS. *(Any Section.)*

INLET and OUTLET PIPES in either CAST or WROUGHT IRON, or STEEL.



HYDRAULIC MAINS.
FOUL MAINS.
CONDENSERS.
RETORT-LIDS.
PURIFIERS.
HYDRAULIC LIFTS.
ROOFS.
BOILERS in either WROUGHT IRON or STEEL.

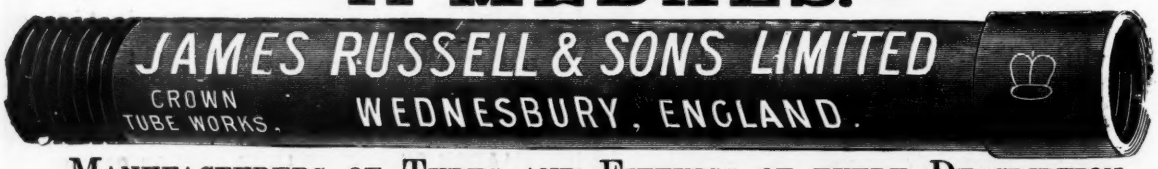
LAMP COLUMNS, MAIN PIPES, and IRREGULARS always in Stock.

THE IRON-WORKS, FROME, SOMERSET.

London Office: 181, QUEEN VICTORIA STREET, E.C. *BALE & HARDY, Agents.*

HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE, AND OTHERS.

—11 MEDALS.—



MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

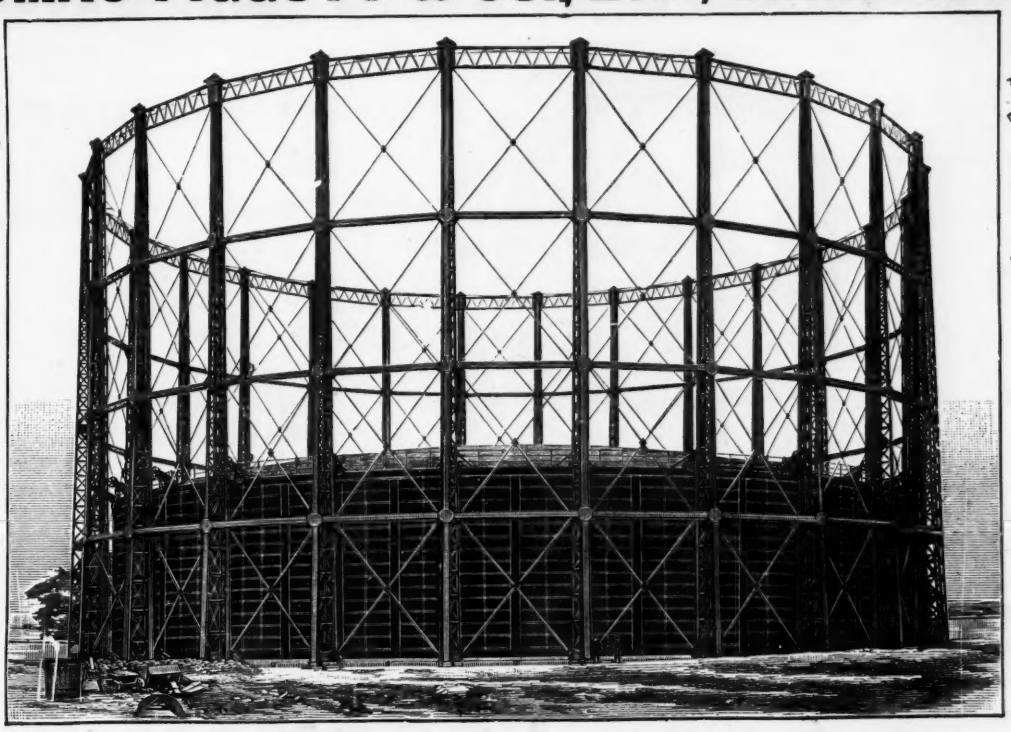
SCREWING TACKLE, BOILER MOUNTINGS, VALVES, COCKS, ETC.

LONDON: 108, Southwark Street. MANCHESTER: 33, King Street West. BIRMINGHAM: 114, Colmore Row. LEEDS: 6, Mark Lane. New Briggate.

THOMAS PIGGOTT & CO., LTD., BIRMINGHAM.

LONDON OFFICE: ST. THOMAS APOSTLE, E.C.

GAS PLANTS, BOILERS, ENGINES, PUMPS, ROOFS, RETORT FITTINGS, ETC.



TELEGRAPHIC ADDRESS: ATLAS BIRMINGHAM

WELDED & RIVETED PIPES, FOUL MAINS, RETORT LIDS, WROT & CAST TANKS, PURIFIERS.

MANUFACTURERS OF

Humphreys & Glasgow's Patent Carburetted Water-Gas Plant.

INSTALLATIONS HAVE ALREADY BEEN SUPPLIED, AND ARE IN HAND FOR THE FOLLOWING GAS-WORKS: COPENHAGEN, BELFAST, GLASGOW, BRUSSELS, SANTIAGO, SWANSEA, TOTTENHAM, LIVERPOOL, BRIGHTON, BATH, PRESTON, SOUTHPORT, NEW YORK, NEWBURGH (N.Y.), NEWBURGH (SECOND CONTRACT), HOYLAKE, BELFAST (SECOND CONTRACT), EDINBURGH, TOTTENHAM (SECOND CONTRACT), WINCHESTER, MANCHESTER, BRUSSELS (SECOND CONTRACT), ST. JOSEPH (MO.), HOLYOKE (MASS.), SHANGHAI, STOCKTON, STOCKPORT, NORWICH, GUILDFORD, SYRACUSE, BORDENTOWN, LEA BRIDGE, COVENTRY, COMMERCIAL, BRENTFORD, BRIDLINGTON, MIDDLESBROUGH, CROYDON, L. & N. W. RAILWAY CREWE, NINE ELMS, BROMLEY, COVENTRY (SECOND CONTRACT), TAUNTON, ROTTERDAM, DORKING, LEA BRIDGE (SECOND CONTRACT), LIVERPOOL (SECOND CONTRACT), SCARBOROUGH, DURHAM, PERTH (WESTERN AUSTRALIA), COMMERCIAL (SECOND CONTRACT), COMMERCIAL (THIRD CONTRACT), MAIDENHEAD, EPSOM, NORTH MIDDLESEX, BREMEN, WANDSWORTH, FALMOUTH, AARHUS, SOUTHAMPTON, COPENHAGEN (SECOND CONTRACT).

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

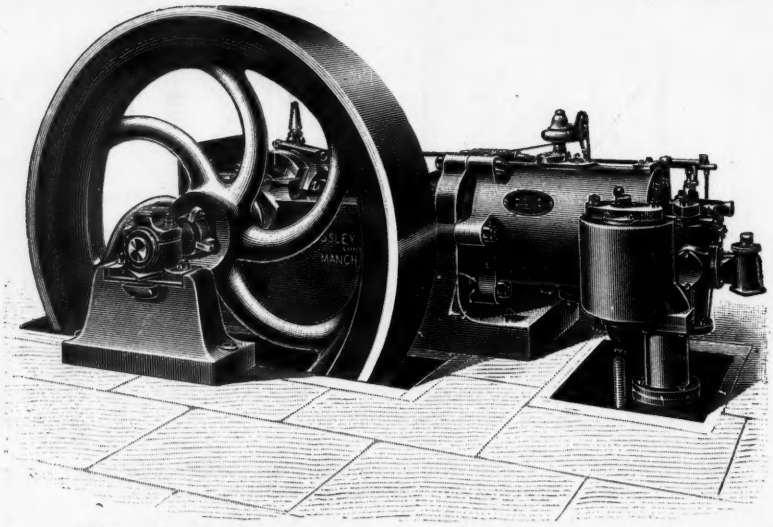
Midland District Office: PRINCE'S CHAMBERS, 6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.

Telegraphic Address: "WIGAN, BIRMINGHAM." Telephone No. 200.

London District Office: 6, STRAND, LONDON—C. PARKER & SON, Sole Agents.

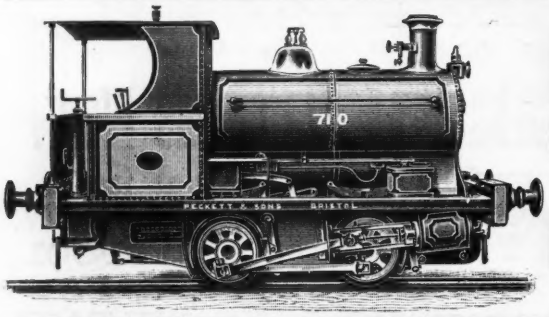
Telegraphic Address: "PARKER, LONDON."

CROSSLEY'S GAS-ENGINES



Represents 16-horse power and 20-horse power nominal High-Speed Electric Light Engines.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER.



LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for Immediate Delivery.

Photographs, Specifications, and Prices on Application.

PECKETT & SONS, Atlas Locomotive Works, BRISTOL.

Telegraphic Address: "PECKETT, BRISTOL."

NEWTON, CHAMBERS, & CO.,

LIMITED,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

Established 1790

LONDON OFFICE: 19, Great George Street, WESTMINSTER.

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS, IRONFOUNDERS, & CONTRACTORS.

Manufacturers of every description of

PLANT, APPARATUS, and MACHINERY for GAS and CHEMICAL WORKS.

RETORTS and FITTINGS, MOUTHPIECES with Self-Sealing Lids.

Improved COAL and COKE HANDLING PLANT, CONVEYORS, and ELEVATORS,

CONDENSERS, SCRUBBERS, and WASHERS.

PURIFIERS with Planed Joints a Speciality.

Patent CENTRE-VALVES, RACK and SCREW VALVES, WOOD GRIDS, and SCRUBBER-BOARDS, CAST-IRON MAINS, and SPECIALS.

STRUCTURAL WORK, COLUMNS, GIRDERS, and ROOFING.

GASHOLDERS, Cast-Iron or Steel Tanks.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (Special Quality) for Engine Cylinders. GAS COAL famous for its UNRIVALLED EXCELLENCE.

WELSBACH INCANDESCENT GAS-LIGHT.

NEW WELSBACH BURNERS.

25 Candles per Cubic Foot of Gas.

This is the Burner exhibited at Niagara Hall, London, and throughout the Provinces.

The New Welsbach Burner is used without a Chimney.

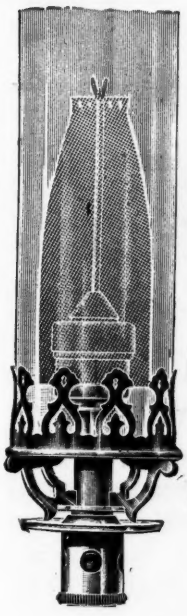
Suitable for Indoor and Outdoor Lighting

Supplied in SIX Sizes,

Consuming from $\frac{3}{4}$ to 7 Cubic Feet of Gas per Hour.

Price from 5/- upwards.

MANTLES from 9d. each.

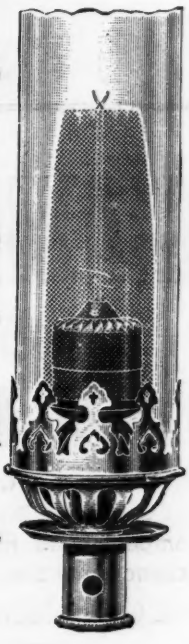


"C" WELSBACH BURNER.

REDUCED PRICES.

"C" Ordinary Burner, 5s. 0d.

"C" Bye-Pass Burner, 6s. 6d.



THE "YORK" WELSBACH BURNER

A CHEAP FORM OF THE "C" BURNER.

50 to 60 Candle Power with $3\frac{1}{2}$ to $3\frac{3}{4}$ Cubic Feet of Gas,

Price complete with MANTLE and CHIMNEY, 4/-.

MANTLES FOR "YORK" BURNER, 1/- EACH.

ALL THE ABOVE PATTERNS CAN NOW BE SUPPLIED.

Complete Price List on Application.

The Welsbach Incandescent Gas-Light Co., Ltd.,

York Street and Palmer Street, WESTMINSTER,

LONDON, S.W.

GIBBONS BROTHERS, LIMITED,

Telegraphic Address: "GIBBONS, DUDLEY."

DUDLEY,

Telephone: No. 8013.

GAS ENGINEERS, CONTRACTORS, RETORT SETTERS.

Patent REGENERATIVE SETTINGS,

GIBBONS & MASTERS' PATENT No. 1269, 1893.

SUITABLE FOR WORKS OF EVERY CAPACITY,

AND A SPECIAL FORM OF WHICH IS APPLICABLE TO

GASEOUS FIRING WITH A MINIMUM EXCAVATION.

RETORT-BENCH IRONWORK, CONDENSERS, SCRUBBERS, PURIFIERS, VALVES, &c.

DESIGNS AND ESTIMATES ON APPLICATION.

THE

MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

OVER 60 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies supplied are The Gas Light and Coke Company, The South Metropolitan Gas Company, Birmingham Corporation, Manchester Corporation, Rochdale Corporation, Bristol Gas Company, and many other Works, both large and small, where they have been working in some instances for the past **Seven Years.**

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

SOLE AGENTS FOR REDWOOD & CLOWES' INFLAMMABLE VAPOUR & GAS DETECTORS.

Dealers in Carburine and all other Naphthas and Oils suitable for the Enrichment of Gas.

For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

HOLMSIDE

GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16$\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality)	18$\frac{3}{4}$ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR

PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE & SOUTH MOOR OFFICES,

NEWCASTLE-UPON-TYNE.

MANUFACTURERS: **MAJOR & CO., Ltd.**

BENZOL FOR ENRICHING GAS

HULL AND WOLVERHAMPTON.

INCANDESCENT GAS LIGHTING

Has now gained a complete and final Victory over its last and greatest Enemy

VIBRATION,

BY MEANS OF

CLAY'S PATENT

SHOCK-PROOF

Incandescent Burner Fittings

Of which full Particulars may be had from

CLAY & WALMSLEY,

BOLTON, ENGLAND.

Telegrams: "CLAYS, BOLTON.

See "JOURNAL OF GAS LIGHTING," Dec. 13, 1898, p. 1358, and Jan. 17, 1899, p. 130.

London Representatives: H. Greene & Sons, Ltd., 19, Farringdon Road.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,

COAL OWNERS, NEWCASTLE-ON-TYNE;

OR

E. FOSTER & CO.,

21, JOHN STREET, ADELPH, LONDON, W.C.

WELLS' LIGHTNING PAINTER

LIME AND COLOUR WASHER.

(WALLWORK & WELLS' PATENTS.)

PAINTING BY MACHINE.

GREAT SAVING IN TIME,

PAINT, AND LABOUR.

Painting Speed—3 Square Yards a Minute. Lime-Wash Speed—12 Square Yards a Minute.

Paint Machine, attached to a Single Air-Compressor, Driven by Belt Power. Can also be driven from existing Air-Mains.

No. 1	Painter .	£23	Single Air Compressor	£17	10
No. 2	,, .	£30			
No. 3	,, .	£35	Double ditto .	£27	0

OVER **250** SOLD.

As supplied to the following—

THE GASLIGHT AND COKE COMPANY, THE SOUTH METROPOLITAN GAS COMPANY, THE GLASGOW, BIRMINGHAM, PRESTON, BURSLEM, WARRINGTON, LIVERPOOL, NOTTINGHAM, OLDHAM, AND WEST BROMWICH CORPORATION GAS-WORKS, &c.

Vertical Steam-Engine and Air-Compressor combined with Boiler on Wheel Base.

Price £100.

Larger size Engine, &c., adapted for working up to 4 Machines . . . £180.

Painting Machines Extra.

A. C. WELLS & CO. 113, Midland Rd., St. Pancras, **LONDON.**

Works: CHEETHAM, MANCHESTER.

INCLINED RETORTS

UP-TO-DATE FURNACES AND SETTINGS.

J. & H. ROBUS, 20, Bucklersbury, London, E.C.

JOSEPH EVANS & SONS, CULWELL WORKS, WOLVERHAMPTON.

Telegrams: "Evans, Wolverhampton." PLEASE APPLY FOR CATALOGUE No. 8. National Telephone No. 7039.

12,000 PUMPS IN STOCK AND PROGRESS.

TRADE MARK.

NO TAPPETS.

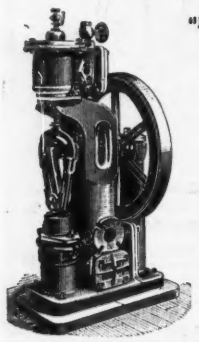


Fig. 705. "SINGLE RAM" STEAM-PUMP.

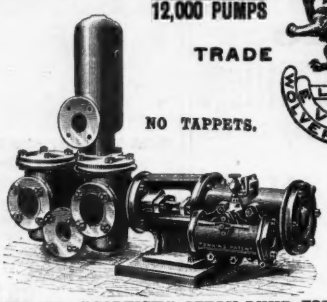


Fig. 686. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

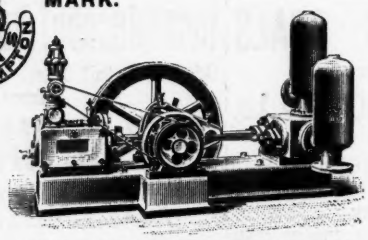


Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 712 "DOUBLE-RAM" STEAM-PUMP.

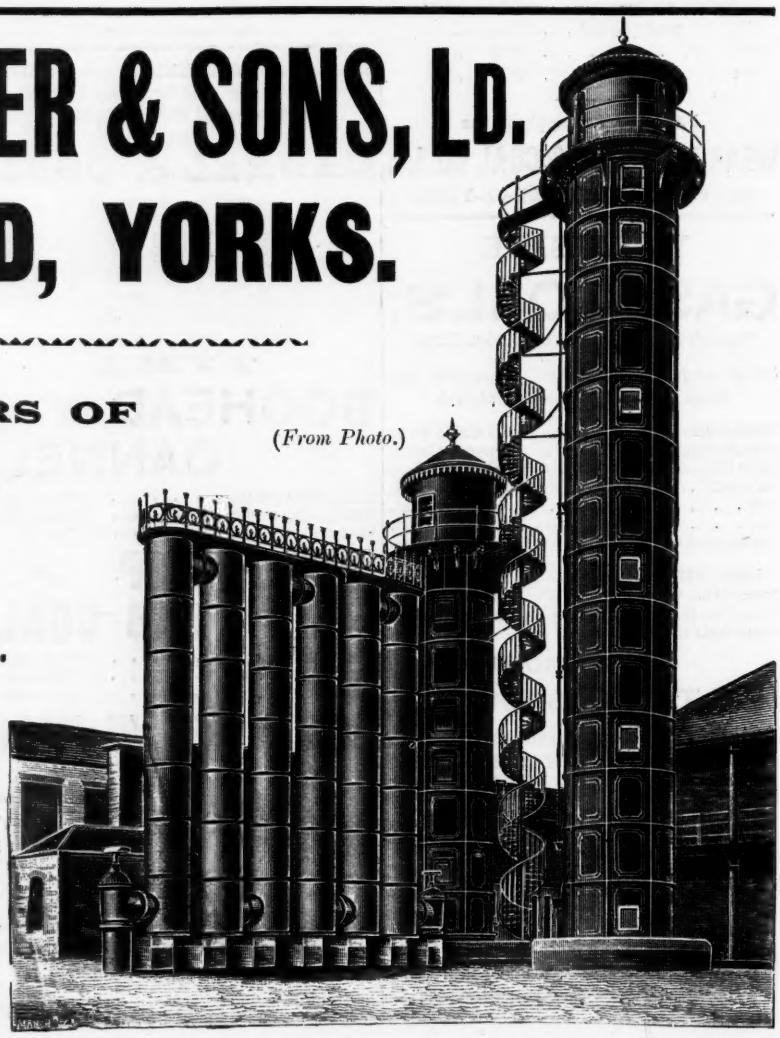
R. DEMPSTER & SONS, LD. ELLAND, YORKS.

MANUFACTURERS OF

GAS PLANT

OF EVERY DESCRIPTION.

(*From Photo.*)



View illustrating Condensing and Scrubbing Plant erected for the Accrington Gas and Water Board by R. D. & Sons, Ltd.

C. HARRISON, Esq., Engineer.

Some of the Gas-Works and Local Authorities using Crosbie's Manufactures.

Aberdovey
Abergavenny
Airedale
Aldridge
Alfreton
Antrim
Armagh
Ascot
Audley
Aylsham
Ballymena
Ballyshannon
Beaumaris
Bentham
Bewdley
Biddulph
Bideford
Birmingham
Blackburn
Blackwell
Bognor
Bollington
Boreham
Bournemouth
Bradley Green
Bramham
Brandon
Bridgnorth
Broadgreen
Broadstairs
Bromsgrove
Broughty Ferry
Builth
Burton
Buxton
Calne
Cannock
Cape Town
Carlow
Castleford
Chester-le-Street
Chesterton
Chipping Wycombe
Cleveland
Clitheroe
Cobham
Coleshill
Collingham
Colney Hatch
Colombo
Coventry
Cranbrook
Cullen
Deddington
Dewsbury
Dover
Downpatrick
Droitwich
Durban
Dursley
East Ardsley
Eastbourne
Elland
Ellesmere
Ellstree
Ennis
Eye
Farnham
Felixstowe
Flint
Garn
Garston
Garw
Gillingham
Gorey
Halesowen
Hanley
Hendon
Hereford
Hinckley
Holywood
Honiton
Hoylake
Huddersfield
Huelva
Huntingdon
Hythe
Ilkeston
Irthlingboro'

PAINTS FOR GAS-WORKS.

PAINTS FOR GASHOLDERS.

Contractors to Her Majesty's Government, the Indian Government, the Natal Government, the Turkish Government, the Netherlands Railway, the London County Council, &c., &c.

CROSBIE'S PAINTS.

Guaranteed genuine and free from adulteration, and specially made to withstand Gaseous Fumes.

Catalogue and Testimonials on Application.

ADOLPHE CROSBIE, LTD.,

COLOUR WORKS, WOLVERHAMPTON.

Some of the Gas-Works and Local Authorities using Crosbie's Manufactures.

Johannesburg
Kegworth
Kildwick
Kilrush
Kineton
Kirkburton
Knutsford
Leamington
Ledbury
Leek
Leven, N.B.
Limerick
London
Loughborough
Lymington
Machynlleth
Merthyr Tydfil
Milborne Port
Minster
Monte Video
Napier (N.Z.)
New Mills
Newnham
North Middlesex
Odiham
Ogmore
Outlane
Parsonstown
Pembroke
Penmaenmawr
Pietermaritzburg
Portadown
Port Elizabeth
Portrush
Portsmouth
Pwllheli
Ramsey
Raunds
Richmond
Rochester
Roscommon
Rugeley
Sandgate
Scarborough
Seaham Harbour
Seisdon
Shifnal
Shipston-on-Stour
Sidmouth
Skibbereen
Slough
Southam
Southend
Stafford
St. Albans
Stamford
Storrington
Strood
Stroud
Sudbury
Swinton
Tetbury
Tokio
Uppingham
Uttoxeter
Ventnor
Warwick
Wexford
Wigston
Willenhall
Witney
Wollaston
Wolverhampton
Workington
Wotton

Telephone No. 103. Telegraphic Address: "ELEVATOR, HASLINGDEN."

S. S. STOTT & CO.,

ENGINEERS, HASLINGDEN, NR. MANCHESTER.

COAL AND COKE ELEVATORS & CONVEYORS.

COAL AND COKE STORAGE PLANTS.

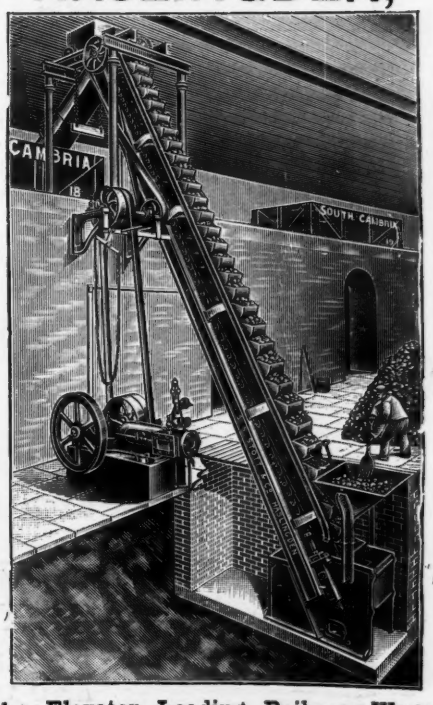
COAL AND COKE BREAKERS.

WHARF ELEVATORS FOR UNLOADING BARGES.

ELEVATORS & CONVEYORS for BOILER-HOUSES.

STAMPED AND RIVETED STEEL ELEVATOR BUCKETS.

DETACHABLE CHAINS AND SPROCKET WHEELS.



Coke Elevator Loading Railway Waggons.

LIME AND OXIDE ELEVATORS & CONVEYORS.

HIGH-CLASS STEAM-ENGINES up to 1000-Horse Power.

PUMPS, HORIZONTAL AND VERTICAL, SINGLE, DOUBLE, or THREE-THROW, for WATER-WORKS, &c.

BEAM PUMPING-ENGINES.

AIR-COMPRESSORS.

BELT PULLEYS, ROPE PULLEYS, GEARING, &c., &c.

AMERICAN GAS OIL

SOLE IMPORTERS—

ANGLO-AMERICAN OIL COMPANY, LIMITED,

This well-known quality of Oil is used at most of the Corporation Works and Companies' Works throughout the United Kingdom. Contracts have also been entered into with several of the large Railway Companies.

LARGE STOCKS. PROMPT DELIVERY.

Stock of about 30,000 Tons is usually carried by us at our Installations at Avonmouth, Birkenhead, Barrow, Manchester, and London.

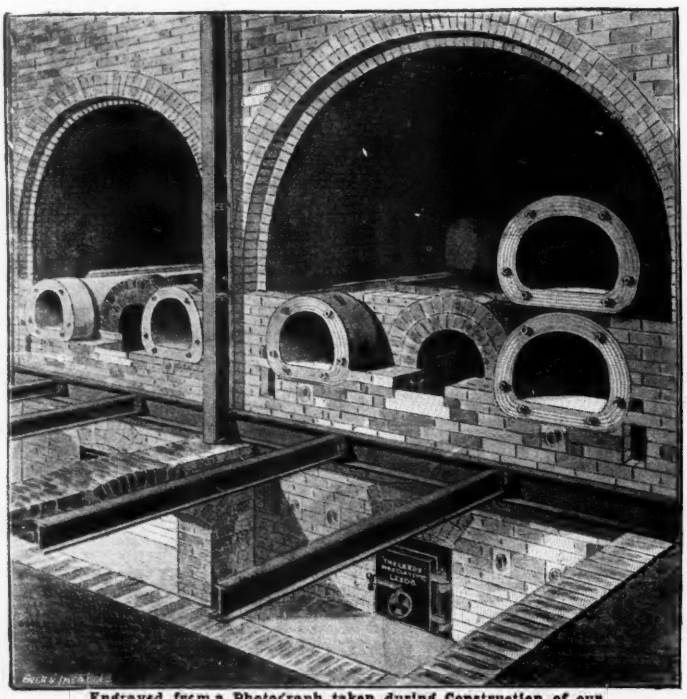
HEAD OFFICE:

22, BILLITER STREET, LONDON, E.C.

THE LEEDS FIRE-CLAY CO., LD., ENGINEERING DEPARTMENT

Telegrams: "SETTINGS, LEEDS." Telephone: No. 612.

WORTLEY, LEEDS.



Engraved from a Photograph taken during Construction of our Shallow Regenerator Settings.

RETORT-SETTINGS

OF EVERY DESCRIPTION

INCLINED, HORIZONTAL,

REGENERATOR, GENERATOR,

and DIRECT FIRED.

SHALLOW REGENERATORS A SPECIALITY

MANY INSTALLATIONS.

EXCELLENT RESULTS OBTAINED.

RETORTS RE-SET.

RETORT IRONWORK.

COAL AND COKE-BREAKING AND CONVEYING MACHINERY.

BUILDINGS, ROOFS, &c.

THE "DE BROUWER"
PATENT COKE-CONVEYOR

FOR ELEVATING AND CONVEYING.

SUPERSEDES ALL OTHERS FOR DEALING AUTOMATICALLY WITH

— HOT COKE. —

DOES NOT BREAK THE COKE. SIMPLE AND EFFECTIVE.

25 INSTALLATIONS now at Work.

SUITABLE FOR SMALL AS WELL AS LARGE RETORT-HOUSES.

GUARANTEED BY SOLE MAKERS:

W. J. JENKINS & CO., Ltd., RETFORD.

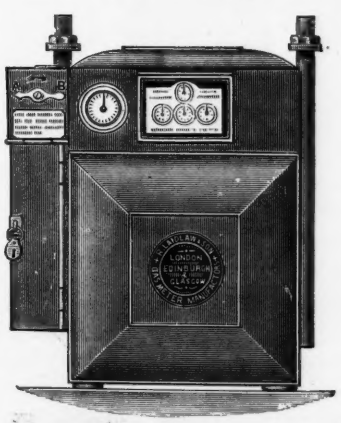
R. LAIDLAW & SON

GAS & WATER ENGINEERS.

MANUFACTURERS OF WET & DRY GAS-METERS,

SIEMENS WATER-METERS,

PREPAYMENT GAS-METERS.



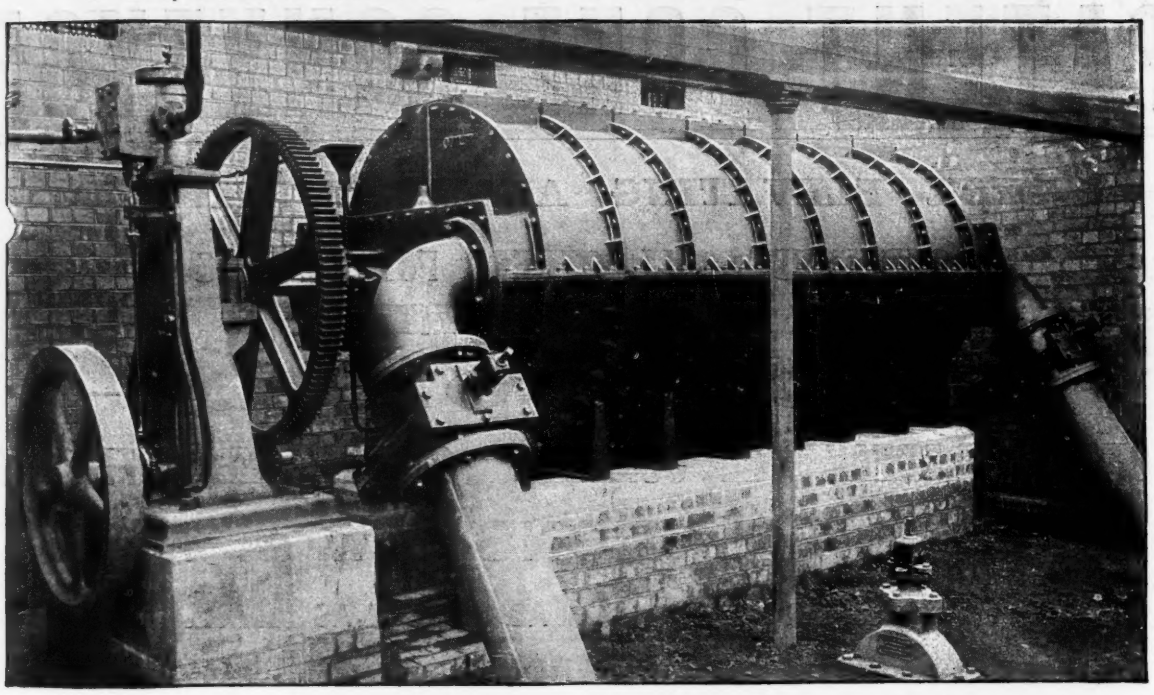
—DRY METER.—

—WET METER.—

EDINBURGH: SIMON SQUARE WORKS. | **GLASGOW:** ALLIANCE FOUNDRY. | **LONDON:** 6, LITTLE BUSH LANE.

KIRKHAM, HULETT, & CHANDLER, Ld.

3 & 4, PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.



PATENT "STANDARD" WASHER-SCRUBBER

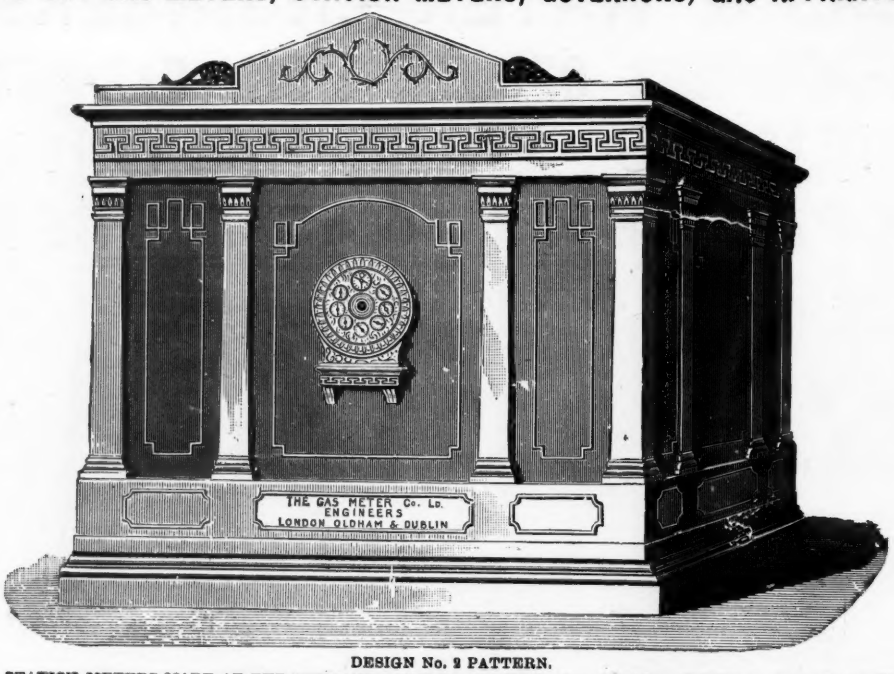
Extracts all Ammonia and a large proportion of Sulphuretted Hydrogen and Carbonic Acid.

THE GAS-METER COMPANY, LIMITED

MANUFACTURERS OF

WET AND DRY GAS-METERS, STATION METERS, GOVERNORS, GAS APPARATUS, ETC.

SQUARE STATION METERS WITH PLANED JOINTS.



STATION METERS IN CYLINDRICAL CASES.

DESIGN No. 2 PATTERN.

STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM (Late WEST & GREGSON). Established 1830.

Prices and Particulars apply to

R. L. ANDREWS, General Manager.

Works: 238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

Telegraphic Address: "METER."

(See Advertisement on back of Wrapper.

ALEX. C. HUMPHREYS, M.E.
A. G. GLASGOW, M.E. } MM.Inst.C.E.

SINCE 1893

MESSRS. HUMPHREYS & GLASGOW

Have constructed or have in hand

CARBURETTED WATER-GAS PLANT

FOR THE FOLLOWING UNDERTAKINGS:—

American construction is instanced only when from the LONDON Designs of Messrs. Humphreys & Glasgow.

	Cub. Ft. Daily.
Copenhagen	700,000
Copenhagen (Second Contract)	2,500,000
Belfast	1,700,000
Belfast (Second Contract)	4,500,000
Brussels	700,000
Brussels (Second Contract)	700,000
Liverpool	3,500,000
Liverpool (Second Contract)	4,500,000
Tottenham	750,000
Tottenham (Second Contract)	750,000
Santiago	400,000
Swansea	750,000
Manchester	3,000,000
Brighton	1,750,000
Preston	1,500,000
New York	1,200,000
Southport	750,000
Bath	1,000,000
Newburgh, N.Y.	350,000
Newburgh, N.Y. (Second Contract)	250,000
Hoylake	125,000
Coventry	600,000
Coventry (Second Contract)	600,000
Bordentown, N.J.	125,000
Winchester	200,000
Shanghai	225,000
Stockport	500,000
Norwich	1,000,000
Holyoke, Mass.	600,000
St. Joseph, Mo.	750,000
Lea Bridge	350,000
Lea Bridge (Second Contract)	350,000
Stockton-on-Tees	500,000
Edinburgh	2,000,000
Guildford	350,000

	Cub. Ft. Daily.
Syracuse, N.Y.	850,000
Brentford	1,200,000
Commercial Gas Co.	850,000
Commercial Gas Co. (Second Contract)	850,000
Commercial Gas Co. (Third Contract)	1,250,000
Bridlington	125,000
Middlesbrough	1,250,000
Croydon	1,250,000
L. & N.W. Railway, Crewe	700,000
Taunton	225,000
Lawrence, Mass.	400,000
Rotterdam	850,000
Dorking	125,000
McKeesport, Pa.	500,000
The Gaslight and Coke Co., Bromley	3,750,000
The Gaslight and Coke Co., Nine Elms	2,750,000
Durham	200,000
New York (Remodelled)	11,000,000
Scarborough	800,000
Perth, W.A.	125,000
Bremen	550,000
Maidenhead	225,000
Epsom	225,000
North Middlesex	150,000
Wandsworth and Putney	1,800,000
Aarhus	800,000
Falmouth	150,000
Southampton	800,000
Hartlepool	750,000
Utrecht	1,000,000
Deventer	150,000
Portsmouth	1,000,000
Bournemouth	1,000,000
Aylesbury	150,000
Stockport (Second Contract)	500,000

In addition to which the 1891 Installations of The Gaslight and Coke Company, on the Humphreys Double-Superheater System, have a capacity of 12,000,000 Cubic Feet per diem.

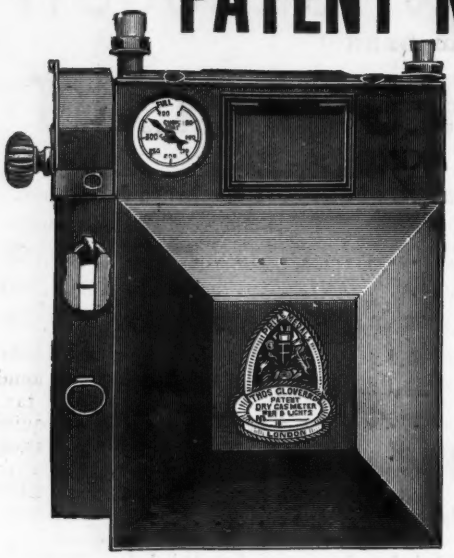
IN THE UNITED STATES, TO DEC. 31, 1898.

Messrs. Humphreys and Glasgow and their Colleagues The United Gas Improvement Company have jointly constructed 293 Sets of Humphreys Double-Superheater Apparatus (excluding earlier extensive construction of Single Superheater and "Combined" Apparatus) with a daily capacity of 219,550,000 cubic feet. **Of this volume, 56,875,000 cubic feet daily were undertaken during 1898.**

9, VICTORIA STREET, LONDON, S.W.
Telegrams: "EPISTOLARY, LONDON."

UNITED STATES OFFICE:
BANK OF COMMERCE BUILDING, NEW YORK.

THOMAS GLOVER & CO.'S
PATENT NEW IMPROVED
PREPAYMENT METER



For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,
DRY GAS-METER MANUFACTURERS,
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN, LONDON, E.C.

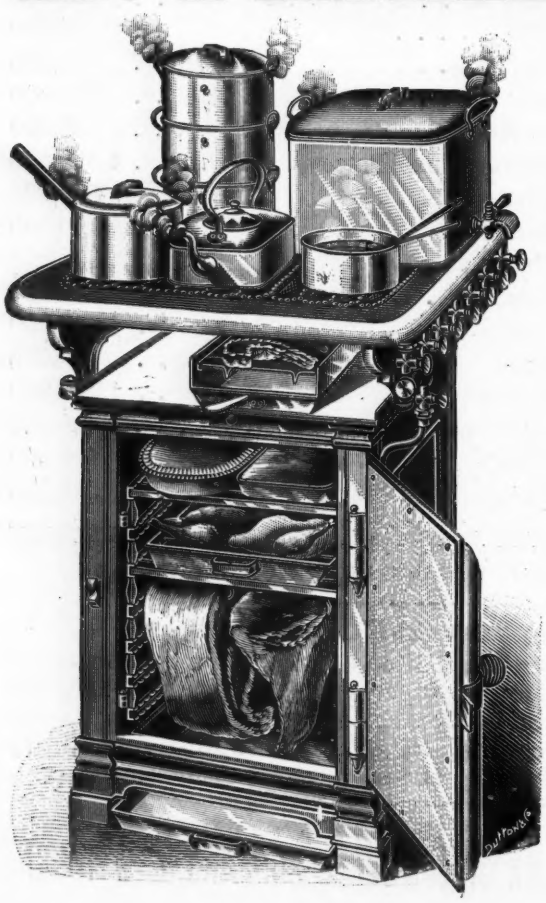
BRISTOL: 28, BATH STREET. *Telegraphic Address: "GOTHIC."* Telephone No. 1005.

BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address: "GOTHIC."*

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address: "GOTHIC."* Telephone No. 3098.

GLASGOW: ARGYLE WORKS, KINNING PARK. *Telegraphic Address: "GASMAIN."* Telephone No. 1525 South Side.

W. PARKINSON & CO.



THE PARKINSON
"Gold Medal" Gas-Cooker
IS UNEXCELLED.

Extra large Crown Plate (Enamel, to lift off), with Removable Burners.

ALL THE LATEST IMPROVEMENTS.

SLOT COOKERS A SPECIALITY.

COTTAGE LANE WORKS, CITY ROAD, LONDON. Telegrams: "INDEX." Telephone No. 778, King's Cross.

BELL BARN ROAD WORKS, BIRMINGHAM. Telegrams: "GASMETERS." Telephone No. 1101.

[See also Advt. on last White Page.

CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

The Budget Proposals . . . 963
The Chartered Bill in Committee—A Reduction of Capital . . 964
The Accounts of the London Gas Companies for 1898 . . . 964
More about the Metric System . . . 964
The Waverley Association Meeting . . . 965
The Economic Influence of the Unit of Currency . . . 965

WATER AND SANITARY AFFAIRS—

The House of Commons and the Government Water Bill . . . 966
The Position of the London County Council's Water Bills . . . 966

ESSAYS, COMMENTARIES, AND REVIEWS:—

The "Heard Fund"—Second List of Contributions . . . 965
Gas and Water Companies in the Stock Market . . . 966
Electric Lighting Memoranda . . . 966
The Summer Instructions of the Gas Referees . . . 967
Accounts of the Metropolitan Gas Companies for the Year 1898 . 968
Intensified Gas Lighting . . . 969
The Fight for the Derwent Watershed . . . 970

NOTES:—

A Novel Deep-Well Pump—A Hydraulic Laboratory—The Evil of Glycerine in Paint . . . 971
The Obligation of Veracity on Writers of Technical Papers . . 972

COMMUNICATED ARTICLES:—

Experiences with the Incandescent Gas-Light. By Norton H. Humphrys, Assoc.M Inst.C.E., F.C.S. . . . 972
The Advantage of "Spring Cleaning" in Gas-Works. By S. Carpenter, of East Ham . . . 973

TECHNICAL RECORD:—

Institution of Gas Engineers—The Forthcoming Meeting . . . 974
Waverley Association of Gas Managers—Meeting in Edinburgh . 975
Ohio Gaslight Association—The Annual Meeting at Springfield . 976

REGISTER OF PATENTS:—

Cylinder Coolers for Gas-Engines—Garner, J. . . . 977
Burners for Incandescent Gas Lighting—Marmuse, M. . . . 977
Automatically Lighting and Extinguishing Gas-Lamps—Hahn, T. 978
Automatic Apparatus for Producing Acetylene—Lacroix, P. A. M. 978
Acetylene Generator—Graetz, A. . . . 978
Turning on, Lighting, &c., Gas from a Distance—Guyenot, P. L. . 979
Cutting off Gas in Case of Fire, &c.—Penman, A. H. . . . 979
Gas-Regulators—Hawkyard, J., and Braddock, J., . . . 979
Burners for Gas-Fires—Yates, H. J., and Prior, J. D. . . . 980
Maintaining the Catalytic Property of Bodies Useful for Igniting Gas—Schultze, K. . . . 980
Lighting Device for Incandescent Gas-Lamps—Himmel, G. . . 980
Incandescent Gas-Burners—Bachmeyer, A. . . . 980
Patent Notices . . . 980

CORRESPONDENCE:—

The Metric System . . . 981
Sulphate Working at Widnes . . . 981
Wooden Water-Pipes . . . 981

PARLIAMENTARY INTELLIGENCE:—

Gleanings from the Committee-Rooms . . . 982
House of Commons—Metropolitan Water Companies [Government] Bill; Progress of Bills . . . 982
Referees' Court—House of Commons—The Fight for the Derwent 983
House of Commons Committee—The Gaslight and Coke Bill . 983
House of Lords Committee—Airdrie and Coatbridge Water Bill . 989
House of Commons Committee—Godalming Water Bill . . . 990

LEGAL INTELLIGENCE:—

High Court of Justice—Chancery Division—The Incandescent Gaslight Company, Limited, *v.* The Daylight Incandescent Mantle Company, Limited . . . 991
The Appeal in the Hull Gasholder Case . . . 992
Gas-Fitters and Gas Explosions—An Important Decision . . . 992
Winding Up of the Acetylene Gas-Light, &c., Company, Limited . 992

MISCELLANEOUS:—

An Important Coal Combination in Lancashire—Probable Advance in the Price of Gas Coal . . . 993
The Board of Trade Report on the Gas and Water Bills and Orders of the Present Session . . . 993
The Management of the Longton Gas-Works—Resignation of Mr. W. S. M'Gregor . . . 993
Metropolis Gas Supply—Chief Gas Examiner's Quarterly Report 993
The Work of the Public Health Department of the Corporation of London in the Past Year . . . 993
The Inspection of Gas and Meters in Massachusetts . . . 994
Electric Lighting Notes . . . 994
Plymouth Corporation Water Supply—The Cost of the New Works; The Remuneration of the Engineer . . . 995
Notes from Scotland . . . 996
Gas and Water Companies' Stock and Share List . . . 996
Current Sales of Gas Products . . . 998
Coal Trade Reports . . . 998

PARAGRAPHS:—

OBITUARY: Mr. Samuel Sampson Lloyd; Mr. Andrew Duncan . 971
PERSONAL: Mr. P. B. Watson; Mr. J. C. Boyd; Mr. J. T. Olguin; Mr. A. M. Cunningham; Mr. F. W. Gaskin; Mr. J. T. Jackson; Mr. Frank Barrett; Mr. W. Thorne; Mr. T. S. Cleminshaw . . 971
Installation of Coke-Ovens by the Bridgewater Trustees—New Pumping Plant at the Gainsborough Water-Works . . . 965
Pneumatic Tools . . . 966
"Inwood's Tables"—The Thermal Conductivity of Cast Iron . . 967
Explosive Acetylene Mixtures—Municipal Work in America . . 972
The Opposition to the Yeadon and Guiseley Gas Bill . . . 981
Morecambe District Council and the Gas-Works—Alleged Nuisance from the Cardiff Gas-Works . . . 992
Manchester Gas—The Patent Gas Enrichment Syndicate . . . 995
Scarcity of Coke at Torquay—Strange Cause of a Fire . . . 998
A Large Gasholder for Blackpool—Explosion in a Gas-Lighted Safe at Liverpool—Electric Lamps Superseded by Incandescent Gas-Lights in Birkenhead Street:—The Reading and Recreation Room at the Dover Gas-Works—New Joint-Stock Company—Accident at the Brighton Gas-Works—The Bolton Corporation and their Tar Tenders—Newtown District Council and the Gas-Works—Buenos Ayres (New) Gas Company, Limited . . . 999
The Ossett Gas-Works Purchase—River Plate Gas Company, Limited—The Bolton Corporation Water-Works Undertaking—Huddersfield Corporation Stock—The Yeovil Gas-Works Purchase—Kingsbridge Water Supply—The Working of the Gas and Water Departments at Middlesbrough . . . 1000
Hamburg Water Supply—Suffocated in a Gas Producer—The Manchester Gas Committee and the Manufacture of Bye-Products—Swansea Gas Company . . . 1001

EDITORIAL NOTES.

The Budget Proposals.

THE Budget speech of the Chancellor of the Exchequer on Thursday last justified the small prophecy respecting the method of meeting the expected deficiency of the national revenue for the ensuing year which was uttered in this column last week. There is to be a new stamp duty of 5s. per £100 on Foreign and Colonial bonds, stocks, and shares not hitherto dutiable. Also, the ordinary mortgage duty of 2s. 6d. per £100 is to be charged on loan capital and debenture stock created by any Corporation or Company under statute. If such issues are made by a non-statutory Company, they have to be secured by a trust-deed, and are liable to the 2s. 6d. mortgage duty. The Chancellor of the Exchequer does not see why the difference should be perpetuated; and there will be few to disagree with him. Then there are to be two increases in the existing stamp duties. New companies' capital duty is now 2s. per £100; and it is proposed to raise this to 5s. per £100, or one-quarter per cent. We are not surprised that the natural desire to get something for the State out of the activity of the company-manufacturing industry should take this form. In addition to the increased capital tax, letters of allotment and renunciation over £5 will require a 6d. instead of a 1d. stamp. Again the same observation applies. Company-making is one of the biggest of British industries; and it will stand taxing far better than many of the commodities that are more heavily taxed.

The only other Budget proposal which we can mention here is the reduction of the rate of extinction of Consols as a process for paying off the National Debt. This operation is an exceedingly difficult subject to deal with. Of course, the statement that the Government mean to release some £2,000,000 annually from the service of the Debt for other purposes, was immediately pounced upon by their political opponents, and will be worked in the party interest for all it may be worth. We are not concerned with this aspect of the matter, but only desire to consider the suggestion on its merits. The fact appears to be that the various funds which go to the redemption of the Debt have grown, and are still growing, at a rather portentous rate. It is hardly necessary to dilate upon the alteration of the public view of the National Debt which has come to pass of late years, and has been helped very largely by the fact of so many people being interested in that other National Debt for which our Municipal Corporations are responsible. It is no longer open for politicians to talk of the old National Debt as an incubus on the country which ought to be got rid of at the earliest possible moment, and by the most summary methods. The people have learnt to look upon the National Debt as only another name for the National Credit. Of course, the money having been originally spent in making the British Empire, and the account being still open, in the sense of being susceptible of increase for the same object at any time, prudence instigates that the outstanding total should be gradually redeemed—for all the world like a municipal loan. But there is no need for hurry about it. The country can well afford the interest charged on the capital; and as we all hope and believe there is no call for setting aside a depreciation fund for the Empire, or any part of it, then whatever can be spared for redeeming the old capital at a reasonable rate is alone necessary to be spent for this purpose. If there is one settled principle of this department of finance, it is that a sinking fund should not be overdone. The right duty is to determine the reasonable rate of redemption, and keep to it. The Government find they can only extinguish the old Debt by purchasing Consols, on which the market premium is 11 per cent. The more they buy, the higher the price will go. Of course, this is no argument against the principle of redemption; but it is a warning not to force the pace. Consequently, the present Administration have decided to reduce the fixed Debt charges from £25,000,000 to £23,000,000 per annum. This will reduce the margin available, after paying interest, for redemption; but inasmuch as the latter proportion will still be 1·6 per cent. of the amount of Consols in the public hands, and therefore liable to come into the market, the canons of sound finance will not be broken. How many municipal debts are being redeemed at a greater rate? The pleasing result of thus giving the taxpayer the benefit of the improved state of the national credit is that an increased income-

tax is rendered unnecessary—for which relief may Sir Michael Hicks-Beach receive the credit and thanks he deserves! This, so far as we are able to extract it, is the essence of the Budget proposals.

Of course, the official Opposition pretend to be furious over the Chancellor's lapse from the purity—or pedantry—of keeping up the sinking fund on the standard adopted, doubtless for good and sufficient reasons, many years ago. The complaint, however, is merely idle thunder. "Front "Bench" criticisms of Budget proposals are rarely much else than recriminations. More trustworthy information concerning the facts and probabilities of taxation and expenditure is usually to be obtained from the observations of ordinary members, which unfortunately are not reported at sufficient length by the party newspapers. Thus, when men like Mr. Brodie Hoare, the member for Hampstead, whose name suggests the wealth and wisdom of Lombard Street, approve the proposals of the Chancellor of the Exchequer, it is needless to inquire what the hack politician thinks of them.

The Chartered Bill in Committee—A Reduction of Capital.

THE Bill of The Gaslight and Coke Company came last week before a Committee of the House of Commons of which the Chairman was Sir William Coddington, who has had considerable experience of Gas Bills. Mr. Pope, Q.C., led for the promoters; explaining that the Bill was mainly for the purpose of enabling the Company to raise £3,500,000 of additional 3 per cent. debenture capital. After Mr. Pope's opening, Mr. Littler, Q.C., for the Corporation of London, and Mr. Pember, Q.C., for the London County Council, raised the difficulty that the Parliamentary Committee on the powers of charge of the London Gas Companies are about to commence work. They objected to the Bill being gone on with, on the ground that it would forestall the possible results of the larger inquiry. The Committee, however, overruled the objection, and decided to proceed with the business remitted to them, in the usual way. Mr. John W. Field, the Company's Secretary and General Manager, was the principal witness for the Bill; and his evidence displayed his well-known mastery of figures. The other matter of Mr. Field's testimony recalled the statement in their own defence issued by the Directors of the Company about this time last year, with a good deal more South Metropolitan comparison worked in. The opponents of the Bill carefully reserved their main attack for the other inquiry. Their cross-examination of the Company's witnesses, who were all officials on the staff, was confined to the point that the amount of fresh capital asked for was excessive. They offered no evidence of their own. Practically, it was admitted that the undertaking wants more capital; and the only question for the Committee was the amount. In the event, the Committee gave the Company £2,500,000, instead of the £3,500,000 asked for—which is perhaps more than they expected to get. It was not to have been anticipated that the opposition of the Metropolitan public bodies would prevent the Company from obtaining the money they might be reasonably held to require for the ordinary development of their business; and the prudent way in which the petition was preferred, disarmed the attacking forces. Indeed, the advocacy for and against the Bill showed the curious picture of Counsel for the Company talking at large about all sorts of extraneous points, and the others declining to take part in a general discussion of the trustworthiness of the administration. Certainly, the Company got off very well. One can, however, easily imagine Mr. Littler and Mr. Pember "dissembling," in the traditional Adelphi style, and muttering darkly as they left the room, "No matter! A "time will come!" The exact date of the meeting of Sir James Rankin's Committee is Thursday next.

The Accounts of the London Gas Companies for 1898.

ON another page we give our customary synopsis of the accounts of the Metropolitan Gas Companies for the past year. While the statistical value of this work is as great as ever, for the particular year, the conversion of the capital stock of one out of the three Companies, and the introduction of oil as a raw material of gas manufacture, prevent the use of the table for comparison with those of previous years except to a very limited extent. When the Chartered and Commercial Companies' stocks have gone the way of the others, there will once more be something like uniformity in Metropolitan gas stocks, from the financial point of view; but inasmuch as the operation of stock conversion is based upon the dividend, and not upon the original capital figure, the amount of a converted stock is of financial, and not of structural or engineering, significance. After the sum has once been arrived at, however, subsequent increases of capital received and expended will possess comparative importance of their own. There will be a new datum; but at present there is nothing of the kind. Next year, the Chartered capital will appear in its new denomination. For the time being, the most expressive figures of the table are those of actual income and expenditure. London—the London of the three great Metropolitan Gas Companies—paid for the gas required for private lighting the enormous sum of £4,158,349. It is a big bill. Ten years ago it was £3,091,617. The bill for public lighting and contract supplies has also risen during the ten years from £208,081 to £238,394—not a very bad increase, considering the inroads made by electric lighting upon the Companies' old preserves. The business has to be done nowadays at a smaller rate of gross profit. Ten years ago the gross profit worked out to £46 6s. 9d. per cent. on the gas-rental; last year it was only £37 13s. 2d. per cent. of the rental. In the table showing increases and decreases of the various items of the accounts for the year, the Chartered exhibit the heaviest pull—£105,543; but this was entirely due to increased price. The Company's public lighting account, to which the increase of price did not apply, shows a decrease of £308. There were noble increases for residuals; the total improvement of these markets running up to £180,637.

TABLE *showing the Residuals produced per Ton of Coal and Cannel, and the Gas made per Ton of Coal, Cannel, and Oil, by the Metropolitan Gas Companies in the Year* 1898.

Name of Company.	Coke.	Breeze.	Tar.	Am. Liq.	Gas.
	Cwt.	Bushels.	Gallons.	Gallons.	Cub. Ft.
CHARTERED	12·36	3·31	10·37	30·34	10,703
COMMERCIAL	12·25	3·71	11·36	35·41	11,159
SOUTH METROPOLITAN .	12·33	4·45	9·82	34·28	10,157
Mean per Ton . .	12·34	3·68	10·25	31·85	10,575

Our customary carbonizing table, given above, does not call for lengthy comment. The Commercial Company's result—of 11,159 cubic feet per ton of "material"—would have been a remarkable one ten years ago; but carburetted water gas and petroleum spirit have "queered" these computations since then. Still, for the sake of preserving the continuity of our record, we publish the statistics in the same old form. Some of the data are unaffected by recent changes; and we can only present them all to our readers with the knowledge that those to whom they may prove useful will know how to apply the requisite corrections for changed conditions.

More About the Metric System.

MR. C. E. BRACKENBURY's rejoinder in to-day's "JOURNAL" to our last week's remarks anent his previous letter on the metric system, is so attractively written that we cannot resist the temptation to add a few more last words to what he declines to regard as a "nice little controversy." There is little real difference between us; and what there is proceeds from the fact of our taking a position of greater deference to popular practice than he elects to occupy. He confesses the opinion that an alteration of our systems of weights and measures might properly be forced upon the people, if they did not consent to it. He argues, moreover, that this consent has already been given, in the form of resolutions passed in favour of the metric system by Town Councils, Trade Councils, and similar bodies. We regret to say that we cannot attach much value to the abstract resolutions of such bodies, and do not believe them to be a complete modern equivalent of the "*vox populi*." It is impossible to repel the suspicion that if any English Government were to propose to establish the metric system compulsorily all over the United Kingdom at the expiration of a period of grace—say two years—there would be such a storm of popular opposition that the Bill would be dropped without delay. When we see that the movement for the adoption of the metric system is really making progress in a practical way, and not merely by resolution, we will join the procession. It is hard to believe all the Consuls say about the disadvantages suffered by British trade owing to our not having adopted the metric system at home. British houses whose trade lies

with metric countries deserve to suffer if they do not look after so simple a matter as invoicing their consignments in any manner desired by their customers. The sort of evidence we should like to have of the advantages of the metric system in trade is like that already offered by the chemists—a real use of the system by common consent. If our firms of spinners, or weavers, or other manufacturers for export to metric countries, find the system convenient on one side of the door, why not adopt it on the other? It is only a question of the stage at which the conversion of the one system into the other would be made—at the taking in of the raw material, or the weighing or measuring out of the finished article. Mr. Brackenbury admits that the decimal subdivisions of the metric units are not convenient in practice; but he argues that it is no reflection on the system that people habitually use aliquot parts of the metrical units. It is equally open to be argued that this is to save the credit of the system by the expedient of disregarding the principle. All the talk about the rationality of the metric system, and the saving of time and labour in doing compound arithmetic sums that would ensue from its adoption for this country, is so much description of the charms of a Delectable Land the passage to which is so long and arduous that it is doubtful after all whether the journey is worth making. We should have to drop and forget our pound, shilling, and penny; our yard, foot, and inch; our gallon, and its convenient subdivisions; our mile and acre; and our pound and ounce. The sacrifice is one of really appalling magnitude, to which that of the Germans of thirty years ago was a trifle; and it is not to be thought that the English people, or Americans, will ever willingly make it from inducements that have been exhibited to them so long and so vainly.

The Waverley Association Meeting.

The Waverley Association of Gas Managers have taken a step in the right direction in holding their spring meetings in Edinburgh. Being a more easily reached centre than many places in the district to which the Association confines itself, the attendance has risen; and it now compares favourably with that at many other Association meetings. As well as convenience of access, there is to be reckoned as one of the leading factors in the improved attendances the fact that local manufacturers have thrown open their works for inspection. Last year Messrs. James Milne and Son, Limited, did so; this year the works visited were those of Messrs. Alder and Mackay. It is quite an education to many gas managers to walk through such works. Rival manufacturers are as welcome as anyone to come and see all that is going on, which is indicative of the good feeling that prevails in local circles. The meeting in Edinburgh last Thursday was, speaking professionally, a very successful one. Though there was not much in it which will be of interest to anyone but themselves, it is after all the fact that the Association primarily exists for the benefit of its members. While this is being attended to, the Association will flourish. A more forward policy might, in a body like the managers in the Waverley district, be found to be an over-reaching one. Happily there is no indication of such an alteration being contemplated.

The Economic Influence of the Unit of Currency.

An engineering traveller in the United States, who recently gave his professional brethren at home an interesting account of his experiences and impressions in the mighty "Land of the Dollar," touched slightly on an important question of popular economics. Speaking of the different prices of labour and most commodities in the United States and in England, he said that "over there" the purchasing power of a dollar seemed to be about the same as that of a shilling here. This is a large generalization; and it would not be fair to press it too hard. At the same time, the observation may be taken to confirm a settled conviction of most travelled persons—that the actual cost of commodities and services to the consumer and user depends far more upon the unit of currency than the canons of Political Economy recognize. There is an infinity of things made up in England in shillingsworths; and when one crosses the Channel into France or Belgium, it quickly appears to the traveller that the franc takes the place of the shilling for very many of the same things. One has only to go a little farther, into Holland, to discover that the Netherlands is a very much more expensive country to live and travel in, simply because the unit of currency is the guilder, of 20d. Going into Germany, again, one drops to the "mark;" and this is only the good old British shilling called by another name. Austria, on the other hand, bleeds the traveller by the florin, which is the more extravagant coin, as it does not keep the same exchange value at two ends of the same street, or from Saturday to Monday. Moreover, the reckless way in which English people squander the paper money of every country but their own is notorious. There is something antecedently probable, therefore, in the story that in New York a dollar does not go farther for most things than a shilling on this side. People have a liking for "even money" prices; and this taste must have an enormous influence in the aggregate in fixing the exchangeable value of commodities and coins. In the gas industry of the United States, the prestige of what is called the "dollar mark" for gas is as remarkable as it is irrational. There is no sound economic reason why "dollar gas" should be a name to conjure with; but, practically, it is a powerful advertisement. All which goes to show that human beings are not always and altogether governed by reason—that, on the contrary, they are glad to get themselves saved the trouble of thinking about the value of anything that can be ticketed in plain figures at a price that involves "no change." So far as the price of gas in England is concerned, we have nothing like the American "dollar mark." There is no magic about "half-crown gas;" and the few gas managers who are able to sell their product "in the neighbourhood," as the American language has it, of two shillings a thousand, do not feel anything magnetic in the figure. Perhaps this is because Englishmen will not call the two-shilling piece, introduced with the amiable intention of decimalizing the coinage, by its face name of "florin." They have had the option of doing so, verbally and on paper, for a good many years now; but our only decimal coin has never got itself recognized as such. The English manager who can sell what might be called "florin gas" never thinks of it as a datum, but will take off another penny the moment he is able.

THE "HEARD FUND."

Second List of Contributions.

In the "Journal" for March 28, we gave a first list of contributions to this fund, sent in response to a suggestion contained in an article the previous week describing some of the early history of Mr. Edward Heard in connection with his introduction of gas lighting into London. The following further contributions have been sent towards the fund:—

	£	s.	d.
Brought forward	22	9	6
Edward G. Heard, J.P. (Truro)	0	10	6
Leamington Gas Company	2	2	0
George Livesey (London)	10	0	0
D Macfie (Edinburgh)	1	1	0
R. O. Paterson (Cheltenham)	1	1	0
George Winstanley (Coventry)	0	10	6
	£37	14	6

Installation of Coke-Ovens by the Bridgewater Trustees.—In the "Journal" for the 11th of October last, we announced that the Bridgewater Trustees were expending between £30,000 and £40,000 in establishing at Greenheys, near Walkden (adjoining their Brackley Collieries), plant for the manufacture of coke and residual products. An installation of 25 ovens is now in operation; but, as the industry is new to Lancashire, only a small number of men are engaged at the works. It is expected, however, that when the undertaking is fully established it will furnish employment to about 200 workpeople.

New Pumping Plant at the Gainsborough Water-Works.—Towards the close of the description of the Gainsborough Water-Works which appeared in the "Journal" on the 7th of February last, it was stated that the old test-pump in the original (No. 1) boring was being replaced by a new one of larger capacity—viz., for 37,000 gallons per hour—the contract for which had been placed with Messrs. D. Y. Stewart and Co., Limited, of Glasgow. At that time the work, which was being carried out under the supervision of the Engineer to the District Council (Mr. Percy Griffith, Assoc.M.Inst.C.E., of Westminster), was well advanced, and was expected to be completed in the course of a few weeks. This has now been done; and a successful trial of the new pump was made, under Mr. Griffith's superintendence, last Thursday. It has a stroke 12 inches longer than the one it has displaced; while the diameter of the tube is an inch greater. At the end of 38 minutes' pumping, the yield was found to be at the rate of 33,350 gallons per hour. The force-pump was afterwards attached, and the machinery started permanently; the water being sent through the rising main into the reservoir.

WATER AND SANITARY AFFAIRS.

THE Government Bill for establishing communication between the works of the several Metropolitan Water Companies was dealt with by the House of Commons in Committee at the commencement of last week, despite an attempt on the part of Mr. Lough to obtain a postponement of the proceedings, in consideration of the circumstance that Mr. Stuart was absent owing to illness. Mr. Chaplin regretted the absence of Mr. Stuart, and the cause of it, but could not allow that influenza should obstruct the progress of legislation. So far as the views of the County Council were concerned, these had been powerfully presented before the Select Committee, and further representations were held in reserve until the Bill came before the other House. The Progressives must be sanguine if they think to succeed better in the Lords than in the Commons with their designs to cripple a measure so imperatively called for, but which they look upon as more especially calculated to fortify the position of the Water Companies. In last week's debate, Mr. Pickersgill urged as an objection that the second clause of the Bill would enable a Metropolitan Water Company, with the consent of the Local Government Board, to raise money required for the purposes of the Act. This he contended was a departure from ordinary parliamentary practice. Yet Mr. Pickersgill might have seen that such a plan had the merit of placing the Companies under a species of control. The other mode of proceeding would be to give the Companies power to spend any amount up to a certain limit, and within this maximum there would be perfect liberty for them to spend as they thought proper for the purpose in question. Possibly Mr. Pickersgill would not object to a "departure from ordinary "parliamentary practice" if the regulation of the outlay were entrusted to the County Council. Anything to give efficiency to the operations of the London Water Companies, even when such operations are designed solely for the prevention of a "water famine," and cannot confer any financial benefit on the Companies, present or prospective, is sure to encounter the opposition of the County Council. Happily for the sake of the East-enders and others, the Committee refused to adopt the views put forth by the opponents of the measure; and the Bill was reported without amendment. It would probably have obtained a third reading forthwith, had Mr. Chaplin pressed it.

The second reading of the Bills by which the London County Council propose to effect the purchase of the undertakings of the Metropolitan Water Companies has been postponed from Thursday last until the 27th inst., in view of the fact that the report of the Royal Commissioners has not appeared. Whether the report, when it appears, will favour the idea of purchase, is a moot question; but the decision of the Commissioners can hardly fail to have some influence on the future of the Bill. Concerning the Welsh Reservoirs Bill, the assurance given by Mr. Whitmore, that it is yet alive, is fully confirmed. The second reading was postponed by the House of Commons on the 21st ult.; but the Bill itself was not rejected. It now stands grouped with the two Purchase Bills, and the four Bills of the Metropolitan Water Companies—making collectively seven Water Bills affecting the Metropolis, of which only the four brought in by the Companies have passed the second reading. Among the latter is the Bill of the Water Companies for establishing intercommunication. For this purpose there is also the Government Bill, which has passed through the Committee stage. But Mr. Chaplin has explained that there is a difference between the two Bills—the Companies' Bill going further in its effects and provisions than the Government measure. Altogether there are therefore eight Bills in Parliament connected with the Metropolitan Water Supply. Over all there impends the report of the Royal Commission, though this is not likely to interfere with any of them, except the three Bills of the County Council.

Pneumatic Tools.—In the course of a paper on "Machine Tools," read by Mr. Ewart C. Amos at the meeting of the Society of Engineers on Monday last week, the author gave some useful information as to the advantages and economy of pneumatic tools. Figures and data furnished by him in this connection showed that, in drilling, four times as much could be done by pneumatic tools as with hand drilling, and that they effected a saving of £50 to £75 per annum per tool, even in a comparatively small drill. A working size pneumatic hammer was exhibited.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 996.)

THE Stock Exchange did not contrive to infuse much more activity into business last week; and the general position still remains a disappointment to all who are looking for a revival. There was an air of uncertainty about the markets—sometimes brighter, sometimes duller, and sometimes uncertain what tone to take. On the whole, however, prices are better, and they closed perhaps as good as they were at any time; but the changes do not amount to considerable figures anywhere. The settlement was not a heavy one, and presented no remarkable feature. The demand in connection with it produced but little effect in the Money Market, which was firm, but quite equal to all possible requirements, and at the close the tendency was all in favour of easier conditions. Business in the Gas Market was a little more active than in the preceding week; but it was quite devoid of any characteristic feature. Nearly all the leading issues were quite unchanged, and made no sort of sign; and variations in value were almost wholly confined to the minor undertakings. However, they were all in the upward direction; and nothing betrayed weakness. In Gaslight issues, business in the ordinary stock was moderately brisk; but prices were rather below than above the middle figures. The secured issues, however, were firmer, especially the preference. The market on Saturday did not seem to notice the Parliamentary Committee's decision on the Company's Bill to raise further capital. South Metropolitan were quiet and unchanged. Commercials were hardly touched; but on *ex div.* quotation they got the benefit of the fractional differences. The Suburban and Provincial undertakings had no more than one or two bargains in the whole week, and were quite unnoticeable. Among the Continental Companies, Imperial closed firmer after a doubtful week, and the others were steady. Of the rest, Hong Kong had a rise; and the Argentine Companies were again conspicuous in advance. River Plate will increase the rate of its dividend to 7 per cent. The Water Companies were disposed to be firmer, and slight advances were effected in East London and Southwark and Vauxhall.

The daily operations were: The tendency in Gas was fairly firm at the opening; and prices were pretty good, but quotations did not move. In Water, East London improved 1½. Business fell away to next to nothing on Tuesday, except for a rush on River Plate, which was run up to high figures—the quotation marking a rise of ¾. Buenos Ayres debenture rose 1. In Water, Southwark 7⅛ per cent. gained 1½. Wednesday was busier, and prices ruled better. Buenos Ayres improved ¼; but River Plate lost ¼, having been overdone the day before. On Thursday business fell back again into a very small compass. Hong Kong advanced ½. Friday was a little better, but not much; and quotations did not move. Saturday was a very fair day, and some good prices were marked; but they were not strong enough to lift quotations.

ELECTRIC LIGHTING MEMORANDA.

The Electric Lighting Contracts of the Corporation of London—The Question of Competition in the City—The Early Sins of the City Company—An Ambitious Metropolitan Scheme Defeated.

THE Board of Trade inquiry into the proposed electric light competition for the City of London has been finished; and the cases of all the parties were so well and plausibly put before Sir Courtenay Boyle that he went away, as he said, feeling in sympathy with "the lady who, having listened to three eloquent suitors for her daughter's hand, could not make up her mind which to accept." This was a very handsome compliment to the professional advocates employed in the inquiry. Before the adjournment for the holidays, Sir C. Boyle had asked whether the Corporation wished to say anything on the general subject; and accordingly a special meeting of the Court of Common Council was held to consider the situation. At this meeting, it was reported by the Streets Committee that they had taken Counsel's opinion as to whether the public lighting contracts between the old Commission of Sewers and the City of London Electric Lighting Company were vitiated by what has become known as the Savory incident. Mr. Danckwerts, the Counsel consulted, was of opinion that the contracts are null and void on this score. Counsel drew particular attention to the dangers attending contracts by the Corporation with Companies who numbered among their shareholders any aldermen or common councilmen of the City, under the drastic provisions of the Sewers Acts, 1848, and 1851. Mr. Danckwerts said that the question of direct or indirect interest had been decided in "*Todd v. Robinson*" (142 Q.B.D., 739) and "*Dimes v. Grand Junction Canal Company*" (3 H.L.C., 59). From these it is clear that a shareholder of a company is a person interested or concerned in a contract made with the Company of which he is a shareholder; and the result is that the Corporation of the City of London at any rate cannot make a valid contract with any Company or firm of which one member is a shareholder or partner. This

emphatic declaration constituted one element of a remarkable and difficult problem for the City government. The consequences that flow from this pronouncement are so serious that further opinion is to be taken; although nobody seems to doubt that Mr. Danckwerts is right in his law.

This matter being postponed, the Corporation had to decide upon their line of policy at the Board of Trade inquiry. Eventually, after a long discussion, it was determined to keep clear of all the Companies represented at the inquiry, in order to reserve the right of the Corporation to undertake the supply of electricity on their own behalf in the probable event of the existing contracts being voided. Accordingly, on the resumption of the inquiry the City Solicitor handed in copies of the resolutions adopted at the special meeting; and the City Engineer gave an account of the way in which the City of London Company fulfil their obligations. This witness was asked bluntly by Mr. Shiress Will, for the Charing Cross Company, if he thought competition in electric light would be to the public advantage; but he declined to be drawn. Nothing was added to the information already available for the guidance of the Board of Trade; and when the inquiry was brought to a close, everybody concerned must have felt that, so far as the question of the expediency or otherwise of competition went, the issue would have to be governed by general principles. The Corporation have asked that their consent should not be dispensed with in respect to the Provisional Orders promoted by the would-be competing Companies; and if the Board of Trade fall in with this suggestion, it will mean the hanging-up of the whole question for another year. The City of London Company would prefer to be left to deal with the Corporation singly; and it is probable the Corporation would rather clear off old scores against this Company before entering into negotiations with another.

The City of London Company, it must be confessed, is now expiating the sins of its youth; and, as usual, the experience is not proving a pleasant one. The promoters of the Company did not deal openly with the Corporation, with the consequence that they made enemies who have neither forgotten nor forgiven them. Besides the juggling with the original contracts, there was the matter of the telephone conduits, which the Company smuggled into their street trenches with the laudable intention of contriving the latter "a double debt to pay—electric light at night, and telephone by day," to paraphrase a familiar couplet. By omitting to take the Corporation into their confidence in this proceeding, the Company permanently antagonized the Local Authority with whom they had to reckon. It was a short-sighted proceeding, this piece of sharp practice on the part of the Company. Of course, as soon as it was found out, the Corporation, whose powers over the City thoroughfares are very strong, forbade the use of the telephone conduits which the Company had put down at a very great expense, and so all the money was as good as wasted. All these things are against the Company; but still, the present Directors are right in preferring to deal with the Corporation alone, and not with a competing concern eating into their vitals at the same time.

The really ambitious scheme of the County of London and Provincial Brush Electric Lighting Company, for carving out a huge Metropolitan business skirting round from Wandsworth to Shoreditch, has been pitched out of Parliament so harshly that nothing more of the same character is ever likely to appear as a Bill again. The Company sought to dispense with the sanction of the Local Authorities; but the Board of Trade declined to accommodate the promoters thus far. Consequently the measure was cut down to "a thing of shreds and patches" not worth having; and even so the House of Commons Committee threw it out without hearing all the opposing counsel. An application for costs on this score failed; the Committee evidently feeling that the promoters had been punished sufficiently by the failure of their plans of extension. Yet as a kind of "electricity supply in bulk" scheme, that proposed by the Company had some merits. The Company would probably have been in a better position for supplying some of the districts scheduled in their Bill than the Local Authorities of these places can ever attain if they should attempt to do the work on their own account. Still, Parliament is not at present in the mood to hand over Local Government areas to electric lighting companies, against the will of the Local Authorities. The reluctance is intelligible, in the circumstances. Electric lighting is not such a crying necessity that it need be forced upon a community whether or no. Besides, the defeated Brush Company may lay the consolation to their souls that if their Act had passed, there would have been nothing to prevent the best areas being shared afterwards with local undertakings. The Company appear to have a grievance against the Board of Trade, if, as alleged, the Department took from October to April to consider whether the consents of the Local Authorities could be dispensed with as asked; but this is not an important consideration. The Bill failed to pass; and it is difficult to believe that anybody could ever have hoped confidently for any better fate for it. The scheme was either at least ten years too late, or else twenty years too soon.

London Water Supply.—At the meeting of the Society of Arts to-morrow evening, Mr. Walter Hunter, Joint Engineer with Mr. R. E. Middleton to the Staines Reservoirs Committee, will read a paper on the above subject.

THE SUMMER INSTRUCTIONS OF THE GAS REFEREES.

THE "Notification" of the Metropolitan Gas Referees for the summer season has been issued. It contains the usual intimation that the maximum amount of sulphur with which gas may be charged is 17 grains per 100 cubic feet; and there are a few alterations in the text, as compared with the document issued last September, to which attention may be directed. In the instructions previously given for making the test for illuminating power, it was required that the index of the regulating-tap should be so placed that the gas-flame gave rather less light on the photoped than the standard, and should then be gradually turned on until equal illumination had been obtained. The position of the index was then to be noted. Next, the tap was to be so turned that the gas-flame appeared to give rather more light than the standard, and should then be turned off until equality was once more attained, and the position of the index again noted. The double operation was to be repeated. The Referees add to these directions the following words: "In making these adjustments, a small alternating movement of the tap may be employed if the gas examiner finds that he can by this means make more consistent readings; but, as stated, the tap is to be turned before each setting, alternately, too high or too low." Further on, in this section of their notification, the Referees require each testing-place to be provided with "a chemical thermometer, divided into degrees on the Fahrenheit scale, and with a standard clock that will go for a week without re-winding." In the directions as to testing for purity, it is required that all connections between the pieces of apparatus are to be on or above the surface of the table upon which they stand. A verbal alteration in another part of these directions makes distinct discoloration of the surface of the test-paper "conclusive evidence" that sulphuretted hydrogen is present in the gas.

No alteration appears to have been made in the appendices to the winter "Notification;" but one has been added—Appendix N—setting forth the procedure which the Referees have arranged with the Gas Companies for the provision and testing of pentane. The Companies are to keep upon their premises one or more properly closed vessels capable of containing from 50 to 100 gallons of pentane. When a supply is needed for use in the testing-places, a number of pint metal cans (this being the limit of size allowed by the Home Office regulations), with screw stoppers, of approved pattern, are to be provided sufficient to contain the whole quantity required. The Referees will see the cans filled, and will affix their numbered lead seal to each. They will then take away one or more of the cans, examine the pentane, and, if it is satisfactory, will attach a numbered label, and send others for attachment to the remaining cans. No certified cans are to be supplied to, or used by, anyone but the gas examiners, without the Referees' written permission; but if application is made to them by the London County Council, the Corporation of London, or any of the Metropolitan Gas Companies, to examine and certify pentane in reasonable quantities for non-official testings, they will be willing to do so. If the sample of pentane examined should not be satisfactory, the Company will be informed of the fact; and the seals are then to be cut off the other cans, and returned to the Referees. The certified cans are to be sent to the several testing-places; and the examiners will take the presence of the lead seal and label, bearing identical numbers, upon any can, as evidence that the pentane has been certified.

"Inwood's Tables."—We have received from the publishers (Messrs. Crosby Lockwood and Son), a copy of the 25th edition of the above-named work, which has been revised and extended by Mr. W. Schooling, F.R.A.S. The book serves innumerable purposes; but the tables which are perhaps of most value to our readers are those relating to sinking funds, which give the annual amount to be set aside and invested in order to replace the capital at the end of a certain period. Twenty different rates of interest, worked out to six places of decimals, are given for every year from 1 to 100. Other tables, which are new in the present edition of the book, deal with interest payable half yearly, quarterly, and monthly; while the income-tax tables show the amount payable on incomes up to £5000 at from 6d. to 9d. in the pound.

The Thermal Conductivity of Cast Iron.—Messrs. E. H. Hall and C. H. Ayres contribute to the "Proceedings" of the American Academy of Arts and Sciences a determination of the thermal conductivity of cast iron. In their experiments, according to "Nature," a disc of cast iron was coated with an electrolytic deposit of copper on its two faces, and the difference in temperature of the faces recorded by galvanometric readings depending on the thermo-electromotive forces of the two couples thus formed. Water at different temperatures was made to flow across the two copper faces, and the total flow of heat measured by comparing the differences of temperature between the water entering and leaving the vessels. The thermal conductivity of the cast iron used was found to be about 0·1490 at 30° C.; its temperature coefficient being about −0·00075 between 20° and 75°. The method used is thought by the authors to be capable of giving better results than have yet been obtained by it.

ACCOUNTS OF THE METROPOLITAN GAS COMPANIES FOR THE YEAR 1898.

—	Chartered.	Commercial.	South Metropolitan.	All the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money	13,105,800 0 0	1,044,017 0 0	7,748,486 0 0 (a)	21,898,303 0 0
Income—viz.:				
Sale of gas by meter	2,907,070 2 10	283,743 13 10	967,536 2 3	4,158,349 18 11
Public lighting, including lighting under contracts	153,055 11 10	20,282 2 9	65,056 16 1‡	238,394 10 8
Rental of meters and stoves	36,277 16 6*	12,337 14 2	62,250 11 6	110,866 2 2
Residual products	726,318 3 3	72,286 0 11	350,860 15 4	1,149,464 19 6
Miscellaneous, including old materials	15,683 9 1	1,203 9 6	6,917 13 2	23,809 11 9
Total income from all sources	3,838,405 3 6	389,858 1 2	1,452,621 18 4	5,680,885 3 0
Expenditure—viz.:				
Coal and oil, including carriage and dues	1,244,828 12 2	146,306 14 9	517,291 1 9	1,908,426 8 8
Purifying materials, including labour	71,863 4 9	10,091 13 7	25,309 13 8	108,264 12 0
Salaries and wages—manufacture	385,139 7 0	39,559 13 6	121,666 6 4	546,365 6 10
Wear and tear—manufacture	306,196 13 6	36,628 9 0	163,585 3 2	506,410 5 8
Rents, rates, and taxes	230,777 14 6	14,236 18 7	58,586 6 7	303,600 19 8
Salaries—management	21,033 15 11	2,258 8 9	4,507 12 7	27,799 17 3
Collectors' salaries and commission	39,235 3 7	3,715 8 9	16,695 11 1	59,646 3 5
Stationery, printing, and general charges	21,211 0 0	2,181 3 1	9,914 2 10	33,306 5 11
Directors and auditors	5,900 0 0.	2,650 0 0	3,701 9 0	12,251 9 0
Salaries and wages, wear and tear—distribution	191,073 4 4	14,597 10 4	77,206 6 4§	282,877 1 0
Repair and renewal of meters and stoves	101,646 6 3	9,371 2 0	39,220 13 10	153,238 2 1
Law and parliamentary charges	5,673 14 6	275 13 7	400 12 7	6,350 0 8
Bad debts and extraordinary expenses	41,813 19 9†	1,564 5 4	33,344 4 8‖	76,722 9 9
Total expenditure on revenue account	2,669,392 16 3	283,437 1 3	1,072,429 4 5	4,025,259 1 11
Gross profit	1,169,012 7 3	106,420 19 11	380,192 13 11	1,655,626 1 1
Do. per cent. on capital and borrowed money	8 18 5	10 3 10	4 18 2	7 11 3
Do. do. gas-rental	38 4 1	35 0 0	36 16 5	37 13 2

(a) Converted. * Stoves only. † Including annuities, £24,398, and £2500 on workmen's compensation account. ‡ Including £14,491 for lighting, repairing, &c.
§ Including £5422 labour for gas-fittings. ‖ Including £8447 paid to pension, &c., funds, and £21,296 paid under profit-sharing scheme.

TABLE *showing the Capital, Income, Expenditure, and Profit, per Ton of Coal Carbonized (including Oil), in* 1898.

—	Chartered.	Commercial.	South Metropolitan.	All the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money	6 5 3·11	4 9 1·69	8 0 2·70	6 12 11·49
Income—viz.:				
Total gas-rental	1 9 2·96	1 5 11·50	1 1 4·23	1 6 8·35
Rental of meters and stoves	4·16	1 0·65	1 3·45	8·08
Residual products	6 11·30	6 2·06	7 3·06	6 11·75
Miscellaneous, including old materials	1·80	1·24	1·71	1·73
Total income from all sources	1 16 8·22	1 13 3·45	1 10 0·45	1 14 5·91
Expenditure—viz.:				
Coal and oil, including carriage and dues	11 10·77	12 5·91	10 8·36	11 7·05
Purifying materials, including labour	8·24	10·34	6·53	7·89
Salaries and wages—manufacture	3 8·17	3 4·53	2 6·19	3 3·81
Wear and tear—manufacture	2 11·12	3 1·53	3 4·59	3 0·89
Rents, rates, and taxes	2 2·47	1 2·59	1 2·54	1 10·12
Salaries—management	2·41	2·32	1·12	2·03
Collectors' salaries and commission	4·50	3·81	4·14	4·34
Stationery, printing, and general charges	2·43	2·24	2·46	2·43
Directors and auditors	0·68	2·72	0·92	0·89
Salaries and wages, wear and tear—distribution	1 9·91	1 2·91	1 7·16	1 8·61
Repair and renewal of meters and stoves	1 0·00	9·61	9·73	11·17
Law and parliamentary charges	0·65	0·29	0·10	0·46
Bad debts and extraordinary expenses	4·80	1·61	8·27	5·59
Total expenditure on revenue account	1 5 6·15	1 4 2·41	1 2 2·11	1 4 5·28
Gross profit	11 2·07	9 1·04	7 10·34	10 0·63

TABLE *showing Increase or Decrease in each Item during* 1898 *compared with* 1897.

—	Chartered.		Commercial.		South Metropolitan.		All the Companies.	
	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
	£	£	£	£	£	£	£	£
Capital and borrowed money	..	..	82,713	..	757,236	..	839,949	..
Income—viz.:								
Sale of gas by meter	105,543	..	6,509	..	33,032	..	145,084	..
Public lighting, including lighting under contracts	..	308	638	..	885	..	1,315	..
Rental of meters and stoves	8,635	..	1,835	..	2,955	..	13,474	..
Residual products	104,517	..	3,079	..	73,042	..	180,637	..
Miscellaneous, including old materials	1,616	..	..	55	405	..	1,967	..
Total income from all sources	220,003	..	12,156	..	110,319	..	342,477	..
Expenditure—viz.:								
Coal and oil, including carriage and dues	49,656	..	1,226	..	38,203	..	89,085	..
Purifying materials, including labour	4,852	..	1,072	..	2,211	..	8,136	..
Salaries and wages—manufacture	..	9,651	..	6,436	5,812	..	..	10,276
Wear and tear—manufacture	..	3,454	2,853	..	7,716	..	7,115	..
Rents, rates, and taxes	..	1,739	..	132	..	108	..	2,979
Salaries—management	2,418	..	15	..	..	37	2,396	..
Collectors' salaries and commission	1,494	..	374	..	977	..	2,844	..
Stationery, printing, and general charges	2,609	..	51	..	..	407	2,253	..
Directors and auditors	..	..	..	..	..	24	..	24
Salaries and wages, wear and tear—distribution	4,633	..	847	..	2,209	..	7,689	..
Repair and renewal of meters and stoves	261	..	934	..	12,164	..	13,359	..
Law and parliamentary charges	..	405	74	..	..	5,834	..	6,165
Bad debts and extraordinary expenses	..	41	..	5	3,564	..	3,518	..
Total expenditure on revenue account	50,633	..	873	..	66,446	..	117,951	..
Gross profit	169,370	..	11,283	..	43,873	..	224,526	..
Do. per cent. on capital and borrowed money	£1 5s. 11d.	..	£0 5s. 10d.	..	£0 2s. 0d.	..	£0 15s. 4d.	..
Do. do. gas-rental	4 7 6	..	2 18 10	..	3 2 11	..	3 19 9	..

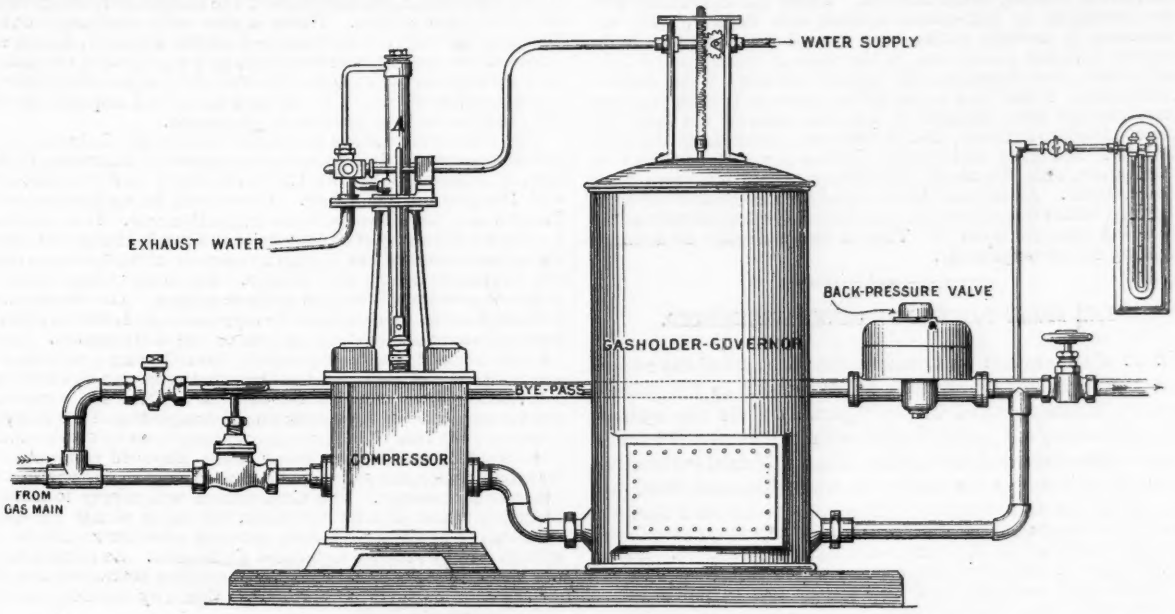
INTENSIFIED GAS LIGHTING.

THE newest thing in gas lighting to be seen just at present in London is at the Marylebone Terminus of the Great Central Railway, as already noticed in the "JOURNAL" (*ante*, p. 654). This installation is on the Somzée-Greyson principle; the plant being designed and adapted to the special application by Mr. William Sugg. The particulars of the lighting will be found in the earlier notice referred to, and need not be repeated here.

We revert to the subject to-day in order to place upon record the accompanying drawing of the compressing plant, which effects the purpose of raising the illuminating duty of the gas burnt to an average of 30 candles per cubic foot. Gas engineers are familiar with the elementary suggestion of improving illuminating effect by raising the pressure. Before the advent of the incandescent gas-burner in its present form, several projects for improved gas-lighting systems were put forward, all involving a special compressed air service, or some such impracticable accessory. When the Welsbach system had finally approved itself, it was perceived to be essentially a high-pressure system. The old principle, of delivering the gas to the burner at the lowest pressure consistent with steady flow, became discredited. The bunsen burner which formed the foundation of incandescent lighting wanted a good gas pressure. As soon as the most favourable constitution of the mantle was settled, attention was diverted to the bunsen burner; and it was quickly discovered that the question of getting the greatest lighting effect out of the mantle was one of the design of and supply to the burner. Not to go over all the ground, the advantage of raising the gas pressure for such a burner to something beyond that existing in the town mains reasserted itself. Fortunately, the advantage was obtainable by increasing the pressure of the gas alone, which made the improvement easy of realization.

While the ordinary Welsbach burners, including the later Kern pattern, were perfect up to the limit of size permitted by indoor and the usual street lighting—say, burners consuming not exceeding 5 cubic feet per hour, and developing a light approximating to 100 candles—it was found to be impracticable to make use of larger burners, and longer mantles, without some means of filling the latter with the proper mixture. This meant a high gas pressure for drawing in the necessary proportion of air. Merely increasing the flow of gas did not answer the purpose. It was the dynamic effect that was wanted. Hence arose the "Intensified" system, which based itself upon an elevated gas pressure—say, up to 9 inches of water—and made the burner to suit. The last necessary of the system—a large and stout mantle—is supplied by the Welsbach Company. Messrs. W. Sugg and Co., with their experience of the requirements and possibilities of actual gas fitting, have put the whole thing together in a workmanlike fashion, with the result that the London Great Central terminus is the first example of an intensified gas lighting installation equivalent in effect to the best electric arc lighting.

Gas engineers are aware that there are many points to be thought of in converting an ordinary gas service into a high-pressure supply. Messrs. Sugg seem to have thought of them all; and the following apparatus realizes the conditions, not merely of an effective supply at high pressure, but also one that cannot go more seriously wrong than falling back upon the ordinary supply. First of all, the service-pipe and connections,



the meter, &c., must be made sufficiently large to obviate any considerable fluctuations of pressure. If the intensified system is to be added to an existing service, it will be expedient to insert an anti-fluctuator before the compressor. We now come to the compressing plant proper. The motive power is preferably supplied by a small hydraulic ram A, shown vertically over the gas-compressor, with which it is directly connected. There are many reasons why water-power should be chosen for the purpose. It is taken off the town main, and is consequently always available. If the lamps are not alight, there is no consumption of water; while the plant works as fast or as slowly as the demand for gas comes on by lighting up or extinguishing any number of lamps. The quantity of water required at 45 lbs. pressure is approximately 1 gallon for every 4 cubic feet of gas compressed. The machines are made of different sizes. The smallest, capable of supplying 15 lights, will use 50 gallons of water per hour; while the largest, or the 100-light size, will take 200 gallons per hour. For important installations, as that at the Marylebone Terminus, the plant is fixed in duplicate. It takes up very little room. The plant illustrated occupies a space of 5 ft. 6 in. long, 3 ft. wide, and 6 ft. high. From the compressor the gas is delivered into the gasholder-governor. Essentially, this is a governor weighted to deliver the gas at 9 inches water pressure. Actually, the gas-chamber is enlarged until it also serves the purpose of a compensating holder, with a capacity of at least two strokes of the compressor. The holder is made of leather, like a dry meter chamber, and is contained in an iron case. The system is made complete by the addition of the bye-pass and back-pressure valve, which come into action in the event of a breakdown or stoppage of the compressing plant. The supply is then kept up at the ordinary town pressure, with, of course, a corresponding diminution of lighting effect.

The principal lights at Marylebone are clusters of three Somzée-Greyson burners, placed in Messrs. Sugg's ordinary "Lambeth" pattern lanterns. At the intensified pressure each burner consumes 10 cubic feet of gas per hour; and the mantles are rated to develop under this condition the light of 300 candles. Adding 100 candles for the reflecting effect, in the downward direction, of the porcelain reflector of the lantern, this gives for every lantern a useful lighting effect of 1000 candles. When the intensified supply is interrupted, and the service is at the ordinary pressure of 3 inches, the gas consumption per burner falls to 7 cubic feet per hour, while the illuminating power drops to about one-third of the effect at the high pressure. This shows the value of the system. There is no pulsation of the light; and the control of the rows of lanterns to suit the requirements of railway working is as easy as with the old order of lighting.

At Marylebone, additional interest attaches to the installation for the reason that it was originally intended to be a stand-by to the electric arc lighting. Consequently, the platform lanterns are spaced rather more widely apart than regard for the best effect would suggest. At the last moment, however, it was found that the electric lighting arrangements could not be completed in time for the opening of the station for traffic; and accordingly Messrs. Sugg were notified that the responsibility for carrying on the whole lighting for an indefinite period would devolve upon them. We are not informed that this circumstance made any material difference to the work. The gas was ready if the electric light was not; and it always will be ready at a moment's notice to take the place of the electric arcs. From what we saw of the lighting of both kinds on Saturday, the 8th inst., when it so happened that the arc lamps spluttered in and out again as though the plant was having its first trial run

and had not "found itself," we believe that those who use the station will hardly perceive any difference between the effects of the two methods. The colour of the lights is practically the same; and their illuminating power is also about on an equality. Consequently, one can be changed for the other without anybody noticing it. Nor is it to be expected that the cost of an intensified gas-light of 1000-candle power will be found to differ widely from that of a full-sized arc lamp driven from the Company's own plant. Everything included, the gas light will probably cost little more than 1½d. per hour; and if the arc lamp takes about half-a-unit of current per hour, it will work out at rather a higher figure, on the assumption that the home-made electricity can be had for 3d. a unit. Thus, for the first time in the history of artificial lighting, we have a completely interchangeable and equivalent service of gas and electricity at the disposal of the public.

Before quitting this subject, let us direct the earnest attention of our gas engineering readers to the significance of the indication here given that the day of a low-pressure lighting service is past. This is one of the lessons of the Marylebone Station lighting. Another is the important one that a branch of business that seemed to have been wrested from gas and delivered over to electricity, especially the home-made brand of the article—the high-power lighting of factories, mills, goods yards, railway stations, and open spaces generally—can be re-captured where it has been lost, and in other cases preserved, by the application of the intensified gas-lighting system as at Marylebone. Light for light, value for value, cost for cost, gas lighting is on a par with the electric arc, supplied from the cheapest source. The same old fittings will serve for the former. There is no need for tearing a building to pieces for electric light wiring, at a heavy cost, to say nothing of the fire risk. Those gas consumers who are fascinated by high-power lighting can have it, with the minimum of trouble, outlay, and loss of time; also with far greater diffusive power, less of the violent opposition of light and shade, and immeasurably greater security from sudden extinctions. More than once, before now, a London railway terminus has been plunged in utter darkness by the failure of the electric arc lighting; and at their best these lamps, by their incessant flickering and hissing, constantly call attention to themselves, with the result of inflicting partial blindness upon the observer. All this can be obviated by the new intensive gas lighting, which does its work so unobtrusively that nobody would bestow a thought upon it. This is the perfection of artificial lighting on the large scale.

THE FIGHT FOR THE DERWENT WATERSHED.

Those of our readers who perused the abstracts of the notices given of intended applications to Parliament in the present session, which appeared in the "Journal" for the 29th of November last, will probably agree with us that next in importance to the scheme of the London County Council for bringing a supply of water to the Metropolis from Wales are those projected by the Corporations of Derby, Leicester, and Sheffield for augmenting their existing sources by others obtained from the watershed of the River Derwent and its tributaries. As the rival claims of the three Corporations will in the course of a few days be hotly contested in a Committee-room of the House of Commons, it may not be uninteresting to give fuller details of the three schemes than we were able to do either in the abstracts of the "Gazette" notices or in the epitome of the provisions of the Bills which has since been published.

The River Derwent takes its rise in the High Peak, at the northern extremity of the county of Derby, and runs for a distance of 38 miles in a south and south-easterly direction—passing Hathersage, Chatsworth, Matlock, Cromford, and Belper—to Derby. It then flows for eight miles south-eastward to the Trent, near Wilne, at the boundary of Derbyshire and Leicestershire. The Ashop is a stream which rises at Ashop Head, on the north side of the Peak, and runs about eight miles in a south-easterly direction to the Derwent, which it joins at Ashopton. The other stream—the Noe—flows into the Ashop. These rivers are fed from a watershed having an area of something like 28,000 acres, upon which there are but few inhabitants; and it is estimated that it will yield about 30 million gallons of water per day. The water is reported to be almost entirely free from salts of lime and magnesia, and to be eminently suited for dietetic purposes.

Having given an indication of the extent of the area and the nature of the water which the promoters of the three schemes are endeavouring to secure, we will briefly describe the schemes themselves. Taking first that of the Derby Corporation, it is proposed to construct a series of eight reservoirs. The first is to be called the Ronksley reservoir, and it will be formed by the construction of a dam across the Derwent about half-a-mile above Ronksley Farm, and extending rather more than a mile up the river. The second reservoir—the Howden—will be situated partly on the Derwent and partly on one of its tributary streams. The Derwent reservoir, the third of the series, will be constructed at the point where the Abbey Brook joins the river. The fourth, or Woodlands, reservoir will be so located as to take the waters of the Ashop and another Derbyshire river—the Alport. The fifth reservoir—the Ashopton—will be situated near Ashopton Bridge, and will intercept the waters of the river before it joins the Derwent. The Bamford reservoir—the sixth of the series—is to be upon the Derwent; while the remaining two, called respectively the Edale and Burbage reservoirs, will store the waters of the River Noe and the Burbage Brook. The waters will be conveyed by means of aqueducts, conduits, or pipe-lines to a large service reservoir to be constructed a little below Ambergate, which will feed another to be situated at Bargate, to the south-east of Belper, and a third at Little Elton, just above Derby. The Bill by which the Corporation seek authority to carry out this scheme asks for power to collect, impound, divert, and appropriate for the purposes of their water undertaking the waters of the Rivers Derwent, Ashop, and Noe, and of the Burbage Brook, and all such rivers, streams, brooks, springs, and other waters, as would or might be intercepted by the proposed works. But while asking for these powers of appropriation, the promoters do not omit to make provision for compensation. It is specified that before the Corporation shall be entitled to take and use any water intercepted by the proposed works, they are to discharge in a regular and uniform flow out of the reservoirs into the beds of the Rivers Derwent, Ashop, and Noe, and the Burbage Brook, as the case may be, within 200 yards of the outlets of the reservoirs, the following quantities of water during the twelve hours of every working day, between the hours of six in the morning and six in the evening: Out of the Ronksley reservoir, 2,200,000 gallons; out of the Howden reservoir, 5,000,000 gallons; out of the Derwent reservoir, 6,000,000 gallons; out of the Woodlands reservoir, 6,500,000 gallons; out of the Ashopton reservoir, 6,800,000 gallons; out of the Bamford reservoir, 15,800,000 gallons; out of the Edale reservoir, 1,400,000 gallons; and out of the Burbage reservoir, 1,000,000 gallons. There is also to be discharged out of the Derwent reservoir into the bed of the Derwent, within 200 yards of the outlet of the reservoir, in a regular and continuous flow throughout the 24 hours of every day, 1,000,000 gallons of compensation water. The amount of capital required by the Corporation for their scheme is £7,500,000.

The works proposed to be carried out by the Leicester Corporation comprise five storage reservoirs—the Ronksley, Ouzleden, and Bamford, on the River Derwent; and the Blackden and Hagglee on the Ashop. There is to be an intake in the Lady Bower Brook, and another in the Derwent. It is proposed to impound the waters of that river and the Ashop at and above the embankment of the Bamford reservoir, as well as those of all the tributary streams and springs. The total storage capacity of the reservoirs will be 8581 million gallons. The waters thus collected are to be conveyed by aqueducts to Leicester, where they will enter the existing system of the Corporation. Compensation water is to be provided in the following quantities per day: On the completion of the Ouzleden reservoir, not less than 4,100,000 gallons into the Derwent at a point not exceeding 200 yards below the reservoir; on the completion of the Hagglee reservoir, not less than 3,700,000 gallons into the Ashop, at a like distance; on the completion of the Bamford reservoir, not less than 10,200,000 gallons, at a point not exceeding 300 yards below that reservoir. The Corporation will supply to a Local Authority whose district lies within ten miles of any aqueduct constructed by them such daily quantity of water as may be required. They propose to borrow £4,144,000. As mentioned in the previous notice of this scheme, provision is made in the Bill for the constitution of a Joint Water Board by the Corporations of Leicester and Derby.

We now come to the proposals of the Sheffield Corporation. Their scheme consists in the construction of three reservoirs—the Howden, the Derwent, and the Bamford—upon the River Derwent. The first will be to the north-east and the second to the south-east of Ouzleden Bridge, which carries the public road over the river; while the third will be to the south-east of Yorkshire Bridge. The waters of the Derwent, Ashop, Westend, and Alport Rivers and a number of brooks and their tributary streams and springs are to be impounded, and conveyed by means of aqueducts into the Sheffield system. The Corporation already have a reservoir within five miles of the Ouzleden Bridge; while their Redmires reservoir is not much more than three miles, as the crow flies, from the Yorkshire Bridge. Before the Corporation supply any water from the Howden reservoir, they are to send down compensation water to the amount of 2,500,000 gallons in one period of twelve hours, and 1,000,000 gallons in the other similar period of each working day; and in the case of the Derwent reservoir, the quantities are to be 3,250,000 and 1,500,000 gallons respectively—these latter amounts to include the compensation water from the Howden reservoir. From the Bamford reservoir, the quantities are to be 9,000,000 and 2,000,000 gallons in the two periods of twelve hours. The Bill contains a number of provisions relating to the amount of compensation water to be sent into the River Ashop. As in the previous cases, the Corporation will be willing to supply water in bulk to Local Authorities requiring it. The amount of money required for carrying out this scheme is £2,275,000.

It is urged on behalf of the Derby Corporation that they have the prior right to the sources of water supply within their own county. At the same time, Leicester is in need of more water; and though the watershed of the Derwent is situated at some distance, it is the nearest source available. Hence their decision to apply for power to utilize it. Sheffield is closer to the water-

shed than either of the other towns; but it is outside Derbyshire. Should the Corporation be successful, Rotherham and Doncaster will come in for a share of the additional water obtained. The contest before the Parliamentary Committee will be a sharp one; and it will be interesting to watch its progress. In the meantime, it may be stated that the Derbyshire County Council have decided to lend the whole of their influence to the Corporation; considering that the interests of the county would be best served by allowing Derby to take possession of the coveted drainage area. On the other hand, the District Councils of Derbyshire are largely of opinion that they will get a cheaper supply of water for themselves by treating direct with Sheffield or Leicester; and on this ground many of them may support one or other of the schemes emanating from these towns. The estimated cost of getting the water is highest in the case of Derby, and lowest in that of Sheffield; the figure for Leicester—the most distant town—coming about midway between the two.

OBITUARY.

The death occurred last Saturday, in his 53rd year, of Mr. SAMUEL SAMPSON LLOYD, a member of the firm of Messrs. Lloyd and Lloyd, of Birmingham, as the result of influenza following a chill taken at the beginning of February. Deceased was the eldest son of the late Mr. S. S. Lloyd, J.P., who died at Woking on the 2nd ult. Mr. Samuel S. Lloyd's death is one of a melancholy sequence—his grandfather, father, mother, and wife having all died within six weeks. He has left five children.

The death occurred last Thursday, from bronchitis, of Mr. ANDREW DUNCAN, Chemist at the Dawsholm Gas-Works, Glasgow. Mr. Duncan had been fifteen years in the service of the Corporation, as gas examiner at Dawsholm, coal analyst, and examiner of other products, more especially of the cyanides. We believe it was his investigations regarding the latter that led Mr. Foulis to take out a patent for a ready and cheap method of manufacturing them, which is now in use at the Aberdeen Gas-Works. Mr. Duncan's loss will be keenly felt, for he was a thoroughly reliable chemist. He was about 38 years of age, and married; but he leaves no family.

PERSONAL.

Mr. PETER B. WATSON, of Castle Douglas, has been appointed Manager of the Stranraer Gas-Works.

Mr. J. C. BOYD, of Whitehaven, has been appointed Surveyor and Resident Engineer during the carrying out of the Geltsdale water scheme of the Carlisle Corporation.

Mr. J. T. OLGUIN, the General Manager of the River Plate Gas Company, has been compelled to leave Buenos Ayres on account of ill-health; and he will not return to his post.

Mr. A. M. CUNNINGHAM has been appointed Manager of the Kilmalcolm Gas Company, in succession to Mr. J. Brodie, resigned. Mr. Cunningham has been for some time Assistant to Mr. J. Ballantyne at Rothesay.

At the meeting of the Institution of Civil Engineers last Tuesday, Mr. F. W. GASKIN, of the Water Engineer's Department, Liverpool, and Mr. J. T. JACKSON, M.A., of the Belfast Water Department, were elected associate members.

Mr. FRANK BARRETT has been appointed Manager of the Ramsbottom Gas Company, in succession to the late Mr. Ingham. Mr. Barrett has been in the service of the Company since 1872, first as meter inspector and then as collector. In November, 1876, he was appointed Secretary; and, taking a keen interest in gas manufacture, the study of which has occupied his leisure time, he has, in addition to his secretaryship, filled the position of yard foreman. He will now hold the two offices of Manager and Secretary of the Company.

As a result of the ballot of the members of the Gas Workers' Union, permission has been granted to Mr. W. THORNE, the General Secretary, to stand as a candidate for the representation of South-West Ham in Parliament. The constituency was at one time represented by Mr. Keir Hardie; but he lost his seat by incurring the hostility of the local Radicals. Mr. Thorne is coming forward as a Socialist nominee; and as West Ham possesses the only Socialist Town Council in the country, and a Liberal candidate is not being put up, it is considered that his return is assured.

From a Ceylon paper recently to hand, we learn that the death of Mr. T. S. CLEMINSHAW, the Manager of the Colombo Gas and Water Company, Limited, which was recorded in the "JOURNAL" for the 4th inst., occurred after only a short illness. Towards the close of February he was suffering from fever of a simple character; but, unfortunately, notwithstanding skilful medical advice and careful nursing, it developed into typhoid, to which he succumbed. On arriving at Colombo, Mr. Cleminshaw entered into his work with great interest, and set about extending the Company's operations in every direction. It was mainly through his exertions that the Company secured the contract for the electric lighting of Kandy; and at the close of last year Mr. J. E. Addyman was sent to England to arrange for the despatch of the necessary plant. By his goodness of heart, Mr. Cleminshaw secured the friendship of all with whom he came in contact; and the greatest sympathy is felt for his widow in her bereavement. Deceased was only 49 years of age.

NOTES.

A Novel Deep-Well Pump.

A novel method of pumping from deep pipe wells, involving the use of no more power than can be conveniently provided by a gas or oil engine, has been introduced in California by Mr. P. K. Wood, of Los Angeles. The system is stated to be extensively adopted for tube wells 200 feet deep and upwards. The problem of getting the water up from wells of this character by cheap pumping appliances demanding small power, is plainly a difficult one to solve by known methods. Our information respecting the Wood system is derived from the "Engineering Record." The principle involved is that of the screw propeller. A central shaft is let down into the well, carrying pairs of screw blades, of slightly less diameter than the well casing, at intervals of 3 or 5 feet. Beneath every pair of propellers is fixed a guide, consisting of a set of spring blades tangential to the well casing, against which they press. These guides are also made to stop the whirling motion imparted to the column of water by the screws, and turn it back normally to the next set of propellers. The idea once grasped, the working of this kind of pump becomes easy of comprehension. The shaft is suspended at the top of the well in a ball bearing, so that the guides in the well do not carry any of the weight. Being caused to revolve at a suitable rate of speed, the shaft, with its propellers, induces a steady flow of water to rise up the well. Obviously, this method of pumping can be easily adapted to any depth of well; while the rate of delivery of water will depend upon the speed of rotation and the pitch of the screws. It is stated that Mr. Wood's screw pumps are largely used for irrigation purposes.

A Hydraulic Laboratory.

At the present time, when so much is being said and written in England about the need for better technical education, it is suggestive to observe what has actually been done by the Cornell University to facilitate the study of hydraulics by American engineers. There has been recently laid down, within the University grounds, a laboratory which will probably be used for some of the most elaborate and extensive experiments ever attempted in the history of hydraulic science. The laboratory was designed by Professor E. A. Fuertes, the Director of the College of Civil Engineers; and it will be open, under some slight restrictions, to any engineer who may wish to conduct in it experiments necessary in the course of his practice, or to pursue an original investigation. Owing to natural advantages, the establishment commands ample water power, with heads of 80 feet and 245 feet. The experimental reservoir is 23 acres in extent. It will be possible to conduct experiments upon the flow of water in bulk, or on high-pressure water motors, meters, pressure regulators, &c. It is impossible even to sketch here the nature and extent of the experimental investigations to which this unique establishment will lend itself; but the provisional list of researches given in the "Engineering Record" as already provided for by the offer of complete arrangements, is enough to "make an engineer's mouth water." The only difficulty lies in choosing the main lines upon which investigation will prove most fruitful. The laboratory, so far as possible, will be reserved for specialists who have reason to know the gaps of available information. Thus, certain problems of drainage and irrigation flow which have given trouble in the past, owing to the designers having been constrained to rely upon formulæ based upon inconclusive data, are to be entered upon at once.

The Evil of Glycerine in Paint.

The subject of the preservative painting of ironwork is becoming of seasonable interest. It was recently treated from the chemical standpoint in "Engineering." The writer remarked that, as the preservation of iron from rusting is generally attempted by the aid of red lead or red oxide of iron paint, it should be a simple matter to give a chemical explanation of the chemical reactions that take place when such a paint is used. In practice, however, the customary addition of driers and turpentine to such mixtures complicates the phenomena. It is pointed out that a simple paint, composed of a mixture of a metallic oxide with linseed oil, is a "soap" as truly as is the compound produced by mixing an alkali with an oil or fat. A mixture of pigment and oil is an oleate of the metal of which its pigment is an oxide. The act of saponification of the mixture appears to be a very simple matter; but though the paint is an oleate or soap of the metal, the case is not always so simple as that due to the action of an alkali or an oil. The character of the oleate varies with the nature of the metal. Thus in the case of a lead pigment, the resulting oleate is a soft unctuous mass capable of being readily spread by the brush, and is partially soluble in water. Zinc oxide makes a harsher oleate than lead, and one that will not so strongly adhere to the surface on which it is laid. So likewise with other paints, which exhibit characteristics similarly distinguishable one from the other. The reason why red lead and oxide of iron make such good preservative paints for iron is that they are capable of absorbing the glycerine of the oil medium, which is the chief source of the weakness of such paints. The presence of glycerine in a paint tends to make it absorbent of water—thus keeping it soft and porous. The inference is that no paint in which free glycerine is present is safe to use on a metallic structure; and the corollary

is that the free glycerine which is inseparable from a paint compound should be neutralized by absorption or else eliminated from the paint mixture. The latter remedy is almost impracticable; and consequently the use of absorbent pigments is recommended. It is asserted to be the presence of glycerine which makes paint blister and peel off—an effect which does not appear to have been previously ascribed to this cause by paint makers and users.

The Obligation of Veracity on Writers of Technical Papers.

The misleading character of most obvious solutions of familiar problems is a commonplace of philosophy. Speaking at the last meeting of the American Association for the Advancement of Science, Professor T. W. Richards, President of the Chemical Section, uttered a not superfluous warning to young chemists and experimenters to distrust the apparently easy way out of difficulties which so often offers itself on cursory examination. He remarked that very few of the processes of Nature are simple in their proximate causes or their outward manifestations, however simple the grand underlying principles may be in their ultimate essence. The old maxim, by which theories are so often consciously or unconsciously judged—"Our theory is so simple that it must be true"—is a dangerous guide. Geber's notion that the whole world consists of sulphur and mercury, and the topsy-turvy delusion of "phlogiston," relied largely on this maxim for support; and it behoves us to avoid similar mistakes. In short, in order to attain to any satisfactory eminence as a theorist in modern natural science, one must be an accomplished chemist, physicist, and mathematician. It is so easy to make a false generalization from certain facts, that most workers in the industrial developments of chemistry and physics will be well advised to keep to their facts and let others offer theoretical explanations. Only—and Professor Richards is most emphatic on this head—a heavy responsibility for accuracy rests upon the collector of facts. If his observations are false, his work is of less value even than that of the false theorist, for he leads others astray. It has not even ingenuity to excuse it, and is worse than useless. "Ostwald has more than once pointed to the responsibility attending publication; and we should all do well to heed his warning." Especially is a warning of this kind needed by possible contributors of professional papers to the proceedings of technical societies. It is not possible to glance over a few volumes of transactions of any technical association without noticing numbers of papers that have turned out to be worthless, because the authors were unsound upon the facts.

Imperial Continental Gas Association.—The Directors of the Association recommend the declaration, at the half-yearly meeting on the 2nd prox., of a dividend of 5 per cent. for the half year ending Dec. 31, free of tax.

Explosive Acetylene Mixtures.—In a recent number of the "Comptes Rendus," MM. Berthelot and Vieille dealt at some length with the subject of the explosive aptitude of acetylene when mixed with inert gases. Two sets of mixtures were examined—acetylene and hydrogen, and acetylene and coal gas. These were gradually compressed, and the pressure zone determined within which the propagation of the explosive wave was possible. Gases decomposable with absorption of heat appear to be apt to diminish the risk of explosion of the acetylene with which they are mixed by absorbing upon their own account a portion of the internal energy of the endothermic and explosive compound.

Municipal Work in America.—In view of the growth of Municipalism in this country, much interest attaches to such observations as those of Mr. G. Livingstone, Surveyor to the Vestry of St. George's, Hanover Square, on the work of American Municipalities. These were given in the form of a paper read before the Association of Municipal and County Engineers. Mr. Livingstone's testimony confirms the current impression that in the United States politics dominate municipal life, which suffers greatly from the influence of the "spoils" system. Speaking of the American street railways, Mr. Livingstone characterizes the overhead trolley-wire system of electric traction, which prevails almost everywhere, as being a monopoly of the roadway, besides possessing other disadvantages. Yet he admits that these electric tramways are certainly a saving of street wear and tear. Very little progress with road motor cars has been made in the United States, where the "iron road" is usually the only good highway; but Mr. Livingstone speaks highly of an American steam buggy in which he had a ride. The street paving in most American towns is in a bad state; and the author questions if there is in any city or town of any rank in Europe, a thoroughfare of the size and importance of Broadway in so deplorably defective a condition. "The condition of the roadway and side walks of this and adjoining streets is a danger to man and beast." The cause assigned is, again, politics. The author has seen streets in which openings had been made in connection with gas or water mains, and had not been filled in for weeks, and even, in some cases, for months. Mr. Livingstone speaks favourably of the electric arc street lighting of American towns, with the reservation that the clear globe generally in use is a mistake, as it gives an unpleasant glare. The subject of town's refuse collection, removal, and treatment is in a backward condition in the States.

COMMUNICATED ARTICLES.

EXPERIENCES WITH THE INCANDESCENT GAS-LIGHT.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

(*Continued from p.* 913.)

The topic of special interest to gas companies is the applicability of the system as an agent for public lighting. There is now a demand for a superior class of light to that afforded by a 4-feet or 5-feet flat-flame burner. This is not only noticeable in our principal towns, but extends even to country villages. The most efficient way in which it has been met is by means of Sugg's or Bray's large flat-flame burners. Where the gas-works happen to be in the hands of the municipal authorities, or where there is a willingness to pay the gas company about two-thirds of the sum that in many cases is cheerfully paid for electric arc lighting, very effective displays have been made. But, generally speaking, the demands on the municipal purse are already so large that no one cares to recommend an increased expenditure; and the incandescent system has been introduced at an appropriate time. It affords a means of increasing the light four or five fold, without adding to the expense. In many instances, the mere replacement of the flat-flame burners by No. 3 or No. 4 new pattern Welsbach's effects the desired purpose without involving costs for alterations, new columns, or even new lanterns. Large areas—such as streets, squares, &c.—can be more effectively lighted by lamps of 50 to 100 candle power than by lights of 1000-candle power placed at proportionately greater distances apart; and therefore the system is making way so rapidly that there is scarcely any town in which it has not either already been adopted or is under trial.

In important towns where the lighting of the streets is in charge of a competent official, with an efficient staff at his command, who has both opportunity and inclination to go closely into details, with a view of carrying on the work after the most efficient and least costly methods, this department may safely be left in the hands of the public authorities. Some of the best results in street lighting have been obtained by corporation officials, who have greater facilities than the manager or other members of the staff of a gas company. But under the circumstances in which the public lighting is carried on in the average country town, the installation of the new system—including the control of every detail, even to the painting of lamp-columns—had better be handed over to the gas company. Ordinary flat-flame lighting may be, and very often is, left to take care of itself. Even with regard to this, efficient inspection and superintendence will be recouped over and over again. The general practice, however, in smaller towns at any rate, is to let the thing go in a slip-shod careless way. No attempt is made to secure a make of lantern that is best suited to the requirements of the district, or that is reasonably wind-proof. It is even too much trouble to keep the posts upright, and some of them have listed 4 to 6 inches out of the perpendicular. Many lanterns are simply shaken to pieces, rather than worn out by fair usage, because they are not firmly secured, but simply placed in loose cradles. Observations from the window of a railway carriage, taken during a journey across country on a fairly blusterous night, will substantiate the statement that a great deal might be done to improve the public lighting with the ordinary flat-flame system. But it cannot be too clearly understood that this sort of thing will not do with the incandescent gas-light, which must be under the care of a competent and painstaking superintendent. To hand the thing over to an ordinary body of lamp-lighters and their foreman, is simply to court failure.

There is an impression abroad that new lanterns, at least, are indispensable to the success of the incandescent light; and it is fostered by the claims of makers of "lanterns specially suited to the system." Certainly great improvements in the construction and design of lanterns have been made, chiefly in the direction of reducing the air-openings; but I have not yet seen the lantern which is so far improved as to warrant the rejection of a good ordinary pattern in its favour. The ordinary plant can be adopted for the new burner at a moderate cost, *if in good condition;* but if the lanterns are already shaky and badly worn, the difficulties and the expense are increased, and the engineer may find himself face to face with the problem of whether the old plant is worth patching and altering. It is, however, simply a question of renewing, and not of rejecting an antiquated and useless pattern in favour of one of more recent fashion. The flat-flame burner has always been treated in practice as both wind and shock proof; but obviously some modifications are necessary in order to protect the mantle from the action of wind, and from the shock or vibration due to the exigencies of ordinary town traffic. During the past winter, I have had in regular operation three or four makes of the new kind of lantern, claimed to be especially constructed for the incandescent system, and also some lanterns of the old or ordinary type, which were slightly altered in our own workshops; and I have not been able to find that any make affords particular advantages in the matter of resisting wind. Not one of them can be depended upon to preserve the naked mantle absolutely steady in stormy weather, or effectually prevent a naked flash-light from being extinguished by rough wind. In sheltered localities, the naked

mantle may be used with some degree of success; but in exposed places, corners of streets, &c., a cylinder or bulb is an absolute necessity—not so much for the preservation of the mantle, as to maintain the flash-light during the daytime.

The consumption of mantles is much greater in the central and busiest portion of a city than in the suburbs. The lamplighters report faulty lamp both at lighting and at extinguishing time. In side streets, and in the outskirts, there is no great difference in the number of morning as compared with the number of evening reports; but in the principal thoroughfares the evening complaints are always more numerous than the morning ones, except on Sundays and holiday times. This shows that the usual conditions of business traffic are responsible for some mischief; and inquiry proves that accidental blows from planks, ladders, or cumbersome loads, an occasional knock from a passing vehicle, and the vibration caused by a traction engine with a load of several trucks of bricks or of rough timber, are the chief causes of this trouble. Most people suppose that the lamp-posts are simply intended and used for the support of the lantern; but the introduction of the incandescent system is a means of finding out that they are made to serve a number of different purposes. A post at the entrance to a builder's or carpenter's yard is in continual danger of receiving a sharp knock from the ends of planks or scaffold poles. One near a brewer's, will occasionally get a barrel rolled smartly against it. Other troubles are not so easily discovered, and call for a little amateur detective work. One thing we have found it necessary to do is to forbid the beating of mats or rugs against the posts. They are also utilized as a tethering post for horses, and in back lanes for taking one end of a clothes-line. In fact, the odd uses of lamp-columns are so numerous that the tenants of the adjoining premises might be fairly called upon to pay a small rent as a recognition of the convenience.

All this, however, does not come under the head of fair wear and tear; and possibly some of the published instances regarding heavy mantle consumption may be due to including it as such. As observed in the case of private installations, a record should be kept of the mantles used at each lamp, and the special culprits marked out for particular attention. It is an extravagant plan, because one or two lamps have proved to be troublesome, to fit up anti-vibration appliances throughout. A little experience and good judgment will indicate where they are really necessary; but in cases of doubt it is preferable to feel the way. Just as there are unusually bad, so there are extraordinarily good instances. Sometimes we cannot find out for a time why one lamp will require a mantle every week; and at others we are puzzling why another in an equally exposed or dangerous position should go for two or three months without trouble. One very obvious conclusion is that much of the difficulty experienced in busy streets is due to local defects—such as the lamp-post not being firmly fixed, the service-pipe being loose in the ground, or the upright pipe having a great deal of play in the column. The lamplighter, when cleaning the lamp, will observe if the service is loose enough to allow lateral oscillation of the burner. Evidently a burner on the end of a 12-foot length of wrought-iron pipe is like a light flower on a flexible stem. The remedy for this is to pack round the pipe at the head of the column, so as to hold it firmly. The column itself may be filled with non-conducting waterproof material—such as soft pitch—or a kind of collar may be made; but in any case the service-pipe should be secured rigidly to the column, and not to the lantern. There will always be a certain amount of vibration of the lantern; so the hole for the admission of the upright should be large enough to leave a good clearance all round.

Lamp-columns intended to carry incandescent gas-lights should be heavy, strong, and so firmly secured in the ground that they will remain perfectly upright and plumb, and will stand stiff and rigid against strong gales of wind, when the lantern is attached. This has not been regarded as a necessity with flat-flame burners; and a few observations on the top of a lamp lighter's ladder during windy weather will show that many posts have an appreciable movement—more especially long ones intended for high-power lights, and which therefore carry large lanterns. Incandescent burners fixed on such posts may be observed to blink in unison with the gusts of wind. In one case a lantern suspended from a heavy and elaborately foliated cast-iron sign in front of an hotel was found to have a play of 4 or 5 inches, or sufficient to swing the mantle off the burner; but the incandescent gas-light was not rejected as a failure. The swinging was stopped, and the whole secured more firmly, with the result that the lamp remains in use and gives a creditable mantle record. With regard to lamp-posts listed out of the perpendicular, the town surveyor may have a sufficient sense of neatness to object to the presence of practical illustrations of the leaning tower of Pisa in the streets; but no inconvenience arises in practice, in connection with the use of flat-flame burners. The incandescent burner must, however, be so set that the mantle hangs quite upright. A slight list in any direction away from the perpendicular is sufficient, not only to cause irregularity in the light, but also unequal heating, to the detriment of the mantle.

As a lamp-post is supposed to be a permanent structure, some little care may reasonably be spent upon the fixing; but frequently it is simply dumped into place, and the ground rammed round it, with no more attention than would be bestowed on a scaffold-pole. If it is not placed on a firm bed, it cannot be expected to keep strictly upright. The bed should be well rammed and covered with a flat stone of sufficient size—worn-out paving-flags will answer the purpose—to receive the foot-plate of the column. If the soil is weak or soft, or liable to be reduced to this condition by the percolation of water, concrete may be used. No particular rule need be laid down, since conditions vary widely. Some posts are fixed on the curb of the pavement, or in heavily macadamized roads, and others on made ground with a loose gravel covering. Not only the method of fixing, but the area of the foot-plate and the part below ground, can be varied with advantage. When set in a pavement, for example, the foot need not be larger than the lower part of the column; but this pattern is quite unsuited for fixing in loose ground. Frequently, however, the posts are ordered from the maker's pattern-book, without the slightest consideration as to the nature of the soil in which they are to stand. The same reasoning applies to bracket supports. Columns are preferable to brackets for several reasons; but in some localities there is no choice. The need for rigidity was never rendered evident with flat-flame gas-burners; but if a bracket must be used for an incandescent burner, it may be worth while to strengthen or stiffen it, which is usually a very simple and easy matter. Claws are preferable to cradles for supporting the lanterns, as enabling them to be rigidly connected to either the column or bracket; but with the aid of some copper binding wire a lantern can be securely tied in a cradle, so that it will not shake with the wind. I am now using some dozens of lanterns fitted in this manner; copper wire having been passed round the studs on the four corners at the bottom, and tied to the uprights of the cradle, with satisfactory results.

(To be concluded.)

THE ADVANTAGE OF "SPRING CLEANING" IN GAS-WORKS.

By S. Carpenter, of East Ham.

If the young gas manager will take the advice given in the present article, the writer ventures to think that seven-tenths of his worry and anxiety will be removed and his mind set at rest. First and foremost he recommends an annual clean-out of all the apparatus used in making gas during the winter. As soon as the time comes for letting down some of the retorts, and when they are sufficiently cold, he advises the manager to begin his annual cleaning; and if he takes as much interest in this operation as the housewife does in the spring cleaning of her house after a winter's accumulation of dirt and dust, he will never regret the time thus spent. The writer is quite aware that all the apparatus cannot be cleaned out at the same time. But the manager should proceed in the following manner: When the retorts which have been let down are sufficiently cold, begin to scurf and mend them. Well examine the flues to see if there are any pieces of brick or other substances in them likely to cause stoppage. Give them a good clean-out, and carefully examine the furnaces to ascertain what repairing is needed. Then well clean the ascension, arch, and dip pipes and the hydraulic main. Do not put fires under the main; but clean it out before the tar gets too cool and thick. If there is not a manhole in the main, cut one in the side (or two, if necessary), about 18 inches long and 6 inches deep, so that a man can put his hand in, with a small scraper, and clean out the main under the bottoms of the dip-pipes by scraping the thick sediment near the hole, whence it can be taken out. After a winter's work, there is always an accumulation of thick tar and other sediment at the bottom of the main. Clear it out before it gets hard; for if this is not done, fires will have to be put under the main, and these are liable to damage it. Next clean out the main leading from the outlet of the hydraulic main to the inlet of the condensers. If there are no flanges that can be taken off, cut some manholes in the main; it is well worth doing. Get some ¾-inch iron rods, hook them together with a hook-and-eye joint, make them quite secure, so that they will not come unhooked when in the main, and then pass them through the main from one manhole to the other. At one end of the rod fasten a good strong rope, and put it through the main. On one end of the rope fasten a bag filled with straw, and to the end of the bag fasten another rope. By drawing the bag through the main, the thick sediment will be brought near the hole, so that it can be readily taken out.

Attention should next be given to the condensers, which should be dealt with according to the kind in use. If they are of the vertical type, take off the flanges at bottom and top; and then you will be able to give them a good clean-out. The main leading from the outlet of the condensers to the exhausters should be cleaned out in the manner prescribed for the main leading from the hydraulic main to the condensers. Next look to the main leading from the exhausters to the scrubbers, and give that also a good cleaning. Then see to the valves of the scrubbers—examining the springs and faces; and next clean out the scrubbers themselves. The process will depend upon the kind in use. If they are tower scrubbers, proceed in the following manner: Shut off the scrubber; have a 2-inch cock at the top, and another at the bottom. Also have a 2-inch cock about 6 inches from the bottom, and connect the steam to it. When everything is ready, turn on the steam and open the top cock, so as to let

the steam pass up through the grids or bricks in the scrubber. After the steam has been on for about half an hour, open the cock at the bottom, and draw off the condensation water which has accumulated. This must be done several times while the steam is passing into the scrubber. It will take about eight hours, with 40-lb. pressure of steam to clear the scrubber. Then well examine the valves, to see if the springs, pinions, and faces are in good condition. Next, clean out the main leading from the outlet of the scrubbers to the inlet of the lime purifiers, look to the valves of the latter, and clean the inside of the purifiers and the grids. Clear the main leading from the outlet of the lime purifiers to the inlet of the oxide purifiers, look to the valves, and clean the inside of the purifiers. Well examine the steam-boilers, and give them a good clean-out. Then overhaul the exhausters, and put them in good working order for the winter. After the foregoing has being done, attention should be turned to the gasholders. Look well to the springs and faces of the valves; and if anything is amiss, have it put right, while the opportunity serves. Well oil the guide-rollers, as they should be kept in good working order, so that the holder is free to move up and down without any friction on the columns.

After all the apparatus has been cleaned out, a manager can well say his house is in good order; and he will pass through the winter without much anxiety, and get good returns from the coals carbonized. He will never regret the trouble and expense entailed in the "spring cleaning." Of course, managers may say they cannot clean out all the apparatus at once. That is true; but the writer would advise that it should be done in this way: Before letting down any of the retorts for repairs, get the holders full, so that gas making can be stopped for awhile. The men thus liberated can be set to clean out the apparatus; doing a little when they are able, and the rest at the earliest opportunity. Especially clean out the hydraulic main, in the manner previously described; for this will reduce by about 60 per cent. the number of stopped ascension-pipes.

Look well to the syphons on the foul gas and on the clean gas mains, and see that they are in good order. These are very important appliances. They play a good part in keeping the main clear of tar and water. If they were allowed to get full, it would be liable to cause a stoppage in the main. The syphons should be dipped every day with an iron rod, to ascertain the depth of water. It is advisable to dip them both before and after pumping, as this will show whether or not the pump is drawing all right. The writer advises that the syphon should be fitted up in the following way, this being the plan he adopted: In the cap of the syphon tap a 1-inch hole, and pass a piece of ¾-inch tube through it. At the end of the tube screw on a long 1-inch socket, with a thread on the outside. Then screw it into the hole in the cap, so that the pump can be fixed to the syphon. If it is fitted up in this way, the piece of ¾-inch tube can be taken out and examined at any time to ascertain if it is all right.

After the plant has been overhauled, have a look at the stores, and see what tools are in stock. Get sufficient ready for the winter's work; for having a good supply will be very helpful to the manager, and also to his foreman. The tools mostly needed are scoops, long drawing-rakes, shovels for the stokers and for filling the coke-barrows, augers for clearing the ascension-pipes at the mouthpieces, long rods for passing up the pipes, short backing rakes for cleaning the coal off the mouthpieces, and barrows for coals and coke. See that there is a good supply of tools for the firemen, such as long and short clinkering-bars, shovels, and pier-bars for the furnaces. Have all the scurfing tools ready, and the long and short slices for mending the retorts; also some well-mixed clay. Look to the purifying material—the oxide of iron and the lime. Ascertain what percentage of sulphur the oxide contains; and have a sufficient stock to last through the whole of the winter. Lay in enough lime to last a month. Then if anything should happen, such as foggy or frosty weather, you will be provided against it. Get in the usual quantity for immediate use, and keep the existing stock up until the time when all the frost and foggy weather will have passed. The manager should test every bag of lime to see that he is getting it of good quality. A yard of well-burnt chalk lime (flare) should weigh from 11 to 12 cwt. Measure a yard, and then well slake it. If it is good lime, it will require from 85 to 90 gallons of water. After it is slaked, measure it again. It should then measure 2⅓ yards. Weigh a bushel of lime and well slake it, and measure it again. It should then measure 2½ bushels. A bushel of unslaked lime should weigh from 56 to 58 lbs.; a bushel of slaked lime, from 32 to 34 lbs. Good flare chalk lime after it is slaked should feel soft when squeezed in the hand; and it should hold together. Lime requires a little attention during slaking, so as not to give it too much water. When properly slaked and mixed, lime is the best material for removing the impurities from gas without deteriorating the illuminating power. The impurities which lime will remove, as the writer has pointed out in previous articles, are carbonic acid (CO_2), sulphuretted hydrogen (H_2S), and bisulphide of carbon (CS_2). It is, however, a dirty material to employ in gas-works, and whether used in a dry or a wet state (cream of lime) it is objectionable, on account of the nuisance it occasions in the neighbourhood. But as lime can be deodorized by a process commonly called revivifying, it can be made use of without creating a nuisance.

The writer believes that a process of purifying gas such as that which he is about to describe will be found both convenient and economical, because it will reduce the quantity of lime used in gas-works, by enabling it to be employed a second time. His practice was to use the lime first, and the oxide of iron second; the process being as follows: The gas from the outlet of the exhauster goes into the scrubbers (the writer prefers those of the tower type). It enters at the bottom and leaves at the top; and, in ascending, is met by water descending in fine streams like rain. The crude gas in the first and second scrubbers is met by strong ammoniacal liquor, and in the other by fresh water. It then passes on to the lime purifiers, in the first of which a portion of the sulphuretted hydrogen and of the bisulphide of carbon is removed. It next goes into the second lime purifier, where another portion of the bisulphide of carbon is taken out. From the outlet of the lime purifiers, it passes into the oxide of iron purifiers. At the inlet of the first, about 2 per cent. of atmospheric air is allowed to go in with the gas. As soon as sulphuretted hydrogen appears at the outlet of the first oxide purifier, a little atmospheric air is passed with the gas into the second purifier. This will keep the oxide active. Instead of constantly employing lime purifiers chiefly as decarbonators, and others as sulphide of calcium purifiers, the writer advises managers to use them in this simple way: Have two lime purifiers (no more) in action at the same time. When the first is sufficiently foul, shut it off, and put on a clean one for the second purifier. Then commence revivifying the foul lime, which will abate nuisance, and prepare the material for use a second time. It is desirable to restrict the use of lime as much as possible—first, because of the expense; secondly, on account of the difficulty of disposing of the refuse material after it has been taken out of the purifier; and thirdly because of the nuisance arising from the evolution of sulphuretted hydrogen during the removal of the spent lime from the purifier. The cost of the lime can be much reduced, and the nuisance greatly minimized, by revivifying the lime before lifting it from the purifier. It can then be used a second time for purifying purposes, and can afterwards be easily disposed of.

It is absolutely necessary to take the temperature of the gas about twice a week, at the outlet of the different apparatus, as furnace gas may be making its way through the chinks in the retorts, and the sulphur from the coke would pass on to the lime purifiers, and interfere with the chemical action of the material on the crude gas. It would also raise the temperature of the gas; and this would give high results in bisulphide of carbon. The following are some of the temperatures taken in the summer: Air, 68° Fahr.; gas at outlet of hydraulic main, 132° Fahr.; at outlet of condenser, 86° Fahr.; at outlet of scrubbers, 68° Fahr.; at outlet of first lime purifier, 88° Fahr.; at outlet of second do., 85° Fahr.; at outlet of first oxide purifier, 76° Fahr.; at outlet of last do., 70° Fahr. The following are some of the temperatures taken in the winter: Air, 40° Fahr.; gas at outlet of hydraulic main, 115° Fahr.; at outlet of condenser, 50° Fahr.; at outlet of scrubbers, 47° Fahr.; at outlet of first lime purifier, 58° Fahr.; at outlet of second do., 64° Fahr.; at outlet of oxide purifier, 52° Fahr. At these temperatures, the lime purifiers were working satisfactorily, and the bisulphide of carbon was from 12 to 14 grains per 100 cubic feet of gas. If at any time the temperature suddenly rises, it will be a sign that there is something going wrong, and the trouble will be due to chinks or small holes in the retorts, where the products of combustion of the coke in the furnace will pass away with the gas, and cause a rise of temperature. If the writer's advice is taken, these interruptions can soon be set right.

TECHNICAL RECORD.

INSTITUTION OF GAS ENGINEERS.

Programme of the Forthcoming General Meeting.

We have received from the Secretary of the Institution (Mr. Thomas Cole) an advance copy of the programme of the forthcoming general meeting, which, as already announced in the "JOURNAL," will take place on the 2nd, 3rd, and 4th prox.

The first two days are devoted to business, which will be transacted at the Institution of Civil Engineers, and the third to a visit to the Staines Reservoir Works, which, as our readers are aware, are now being carried out by Messrs. John Aird and Sons, and an excursion down the river to Richmond. After the usual routine business on the opening day, the President (Mr. F. D. Marshall, of Copenhagen) will deliver his Inaugural Address; and the reading and discussion of papers will then be proceeded with. According to the programme, the first papers will deal with the work of the retort-house; Mr. Thomas Holgate, of Halifax, taking up the subject of "Coal-Handling Plant," and Mr. G. P. Lewis, of Lower Sydenham, that of "Retort Heating." Mr. C. C. Carpenter will follow with a paper on "Distribution;" and this will bring the first day's business to a close. In the evening, the annual dinner will be held at the Trocadero, Shaftesbury Avenue. On the following morning, Professor V. B. Lewes will read a paper on "Incandescent Mantles," and Mr. C. F. Botley one on "The Practical Working of Carburetted Water Gas." The last paper is one by a gentleman—Mr. J. O. V. Irminger—new to the Institution as a paper reader, but not to the gas profession at large; his letters having appeared

occasionally in our columns. He will describe "Some Practical Experiments with regard to Wind Pressures on Buildings"—a subject to which he has given much attention. On the third day of the meeting, an early start will be made from Waterloo; and after the inspection of the works at Staines, luncheon, provided by Messrs. Aird, will be partaken of, and the party will return by steam launch to Richmond.

The annual report of the Council, which accompanies the programme, gives an account of the work of the past year, and records a continuance of the steady progress which has marked the history of the Institution since its formation. The Council express regret that no definite action was taken upon the report made by the Committee on the question of the temperature of gas measurement, submitted at last year's meeting.

WAVERLEY ASSOCIATION OF GAS MANAGERS.

Half-Yearly Meeting in Edinburgh.

Last Thursday the Waverley Association of Gas Managers held their Seventy-Sixth Half-Yearly Meeting in the Central Hotel, Princes Street, Edinburgh. Mr. JOHN M'LAREN, of Duns, presided over the largest meeting which has ever been held under the auspices of the Association. A number of visitors were present.

The HON. SECRETARY (Mr. W. B. M'Lusky, of Selkirk), in submitting the minutes of the previous meeting, said the funds of the Association continued in a satisfactory state.

The PRESIDENT expressed his pleasure at meeting so many members and friends of the Association. It had, he said, been his intention to make an address; but for one or two reasons he had refrained from doing so. In the first place, he did not expect that he would be able to be present at the meeting, as he had had a bad attack of rheumatic fever, and had been confined to the house for two months. He had thus been unable to concentrate his thoughts on any subject. In the second place, he found, on looking over the programme, that there was so much to be done that he questioned whether they could get through the business in the time at their disposal. He must, however, mention that, since they met in September last, they had lost by death another of the old members of the Waverley Association—Mr. Walter Hogg, late of Melrose; and he was sure that all the members and friends there would join him in expressing their sympathy with the relatives whom he had left behind to mourn his loss.

The HON. SECRETARY said he had received a communication, dated Oct. 10, 1898, from Mr. W. T. Dunn, the Secretary to the Incorporated Gas Institute, informing him that at a meeting of the Council of the Institute a resolution had been unanimously passed declaring it to be desirable that application should be made to the Board of Trade with the object of obtaining their recognition to a set of standard meter-unions in the United Kingdom; but that, before any action was taken, a circular should be issued to kindred institutions and associations, asking for their views and observations on the matter. He had replied that the Waverley Association would not meet until April; but that, in the meantime, they would not stand in the way of any progress which the Institute might make in the matter.

The PRESIDENT said that the subject had been before several meetings of the Committee; and, speaking for himself, the standardizing of meter-unions would be a great benefit, because, in a small place like Duns, he had the most of the work to do himself.

Mr. R. S. CARLOW (Arbroath) having been called upon, said there had been several communications between The Gas Institute and the North British Association of Gas Managers; and, as there was to be a meeting between the Committees of these bodies in May, it would be as well to allow the matter to stand as it was.

Mr. D. VASS (Edinburgh) proposed, to keep the affair in order, the appointment of a Committee similar to that which they appointed last year, consisting of the President, the Past-President, and the Secretary, to take charge of the matter.

This was agreed to.

Mr. M'Lusky was unanimously elected President of the Association for the current year, and returned thanks.

Mr. A. C. Young (Kelso) was unanimously elected to perform the duties of Hon. Secretary during the year in which Mr. M'Lusky will occupy the presidency.

Mr. H. RUTHERFORD (Aberlady) then presented Mr. M'Laren with the President's medal; and in doing so he congratulated Mr. M'Laren on the very able way in which he had presided over their meetings.

The PRESIDENT suitably acknowledged the gift.

Discussion.

The President, introducing a general discussion, said that in Duns they had just held a very successful exhibition of cooking appliances—in fact, it far surpassed all that he had expected. During the first and second days they sold almost nothing; but on the third and fourth days they sold sixteen cookers, in addition to small grills. They had sold about £100 worth in all. He expected that the fitting up would cost him a great deal of trouble; but he was quite willing to face it. They sold gas for heating at 4s. 6d. per 1000 cubic feet, and for lighting at 5s. 10d. They were fixing the cookers free. He thought that, taking the size of the place—their annual make was about 5 million cubic feet—they had done very well, and that it would pay them. He expected that next year they would have a make of between 6 and 7 million cubic feet.

Mr. W. BLAIR (Haddington) said that they went in for an exhibition last year. They had not exceeded Duns in the sale of cookers, grillers, and boiling-rings; but they had done fairly well. He was very pleased with the success they had had; for they had an increase of about 15 per cent. in the sale of gas. He would advise anyone who had not gone in for cookers yet to take the matter up. It seemed to be the only way in which, in small places, they could increase the sale of gas.

Mr. A. C. YOUNG (Kelso) said it seemed to him that in the Border towns they were in the happy position of having communities with money, because they appeared to prefer to buy cookers rather than to hire them. He offered them for sale or hire; and out of about £500 worth of cookers sent out, they had only about £40 worth on hire. He found that the griller was as good for the Gas Company as the cooker. In Kelso, they were over a million cubic feet up upon the previous year.

Mr. M'LUSKY remarked that in Selkirk they had finished their first year of hiring and selling cookers. In March, 1898, they had an exhibition extending over six days; and during this time they had purchases amounting to over £600. Since then they had expended between £700 and £800 on gas cooking appliances; so that they had placed an amount of over £1300 in cookers in one year. Though they had offered cookers freely on hire, the total net value of those hired was £44. Their cash charge for all cooking appliances was list price, less 20 per cent.; and they fixed all sorts free, with no limit to as length of pipe. The best class of people bought outright. If the list price of a cooker was £5, the purchaser would pay £4 down, and it cost them about £1 to fix it; so that they had an immediate return of £3. In this way, it paid both them and the consumer better than did hiring. They had about 500 different connections for cooking appliances; and during eleven months they had had an increased make of gas of 3,300,000 cubic feet—equal to about 22 per cent. This increase was entirely attributable to the additional quantity of gas used for cooking and heating purposes, because their ordinary accounts had not increased. It had, of course, to be borne in mind that slot meters had been introduced. During the year, he had fitted 83 slot machines in connection with boiling-rings; and he thought that, in many instances, the boiling-ring brought as good a return as the big cooker. They had just made a rule that no new cookers would be hired so long as they had an old cooker in the show-room. They could afford to do this, because they were getting no cookers back.

Mr. VASS thought that the Border towns were very favourably situated as regarded cookers. The experience in most places was rather the other way. He found that people would rather hire than purchase smaller goods than they were allowed to put out. In Portobello they began, a long time ago, to hire out cookers; and they thought they had taken up all the business in the district. But last year, as soon as the Gas Commissioners entered into possession, and reduced the price of gas, the demand increased; and the number of cookers out had risen from 120 to 180. This was owing to their having had two exhibitions. One of the firms who exhibited had come back this year; and their return was within one or two cookers of what they placed last year—showing that there was still room for more business. There was one matter which gas managers would have before them very strongly, for some little time—that was the question of street lighting. The tendency was to use the incandescent system; and he thought that what they ought to do was to follow up the electric light, and go in for large clusters of incandescent burners—reducing the number of lamps, and, by means of bye-passing, reducing the cost of lighting at the same time.

Mr. J. BLACK (North Berwick) stated that he had an exhibition of gas-cooking appliances last year, which was very successful. He thought that his output would be up 2 million cubic feet.

Mr. YOUNG said that most of them who had read the report of Mr. Herring, of Edinburgh, would see that on the Continent the incandescent gas-lamp was putting the electric light out, except on the boulevards, not only on account of economy, but on the score of efficiency. In the same report, they also found that Liverpool was one of the best-lighted cities; and Liverpool was lit almost entirely by incandescent gas-lamps.

Mr. M'LUSKY said it might not be generally known that in the Border district a gas manager was put in jail for touching a gas-lamp. In Selkirk, there were forty incandescent gas-lamps, with No. 4 burners. These had been gifted to the town by the Gas Company, with the double object of lighting the streets well and making gas popular for other purposes. The Company were satisfied with the result, and they purposed introducing a few more lamps next year.

Mr. J. NAPIER MYERS (Saltcoats) suggested the desirability of the members of the Waverley Association continuing their consideration of the subject of the standardizing of meter-unions, and strengthening the Committee which they had appointed. It was quite possible that the predominant partner—their friends across the Border, whom they had sought to carry along with them in this matter—might not be so very keen for reform as they were in Scotland; but this need not cause them in Scotland to

hesitate in pressing on the reform. This experience in gas making had been fairly divided between England and Scotland. He was Manager, for some years, of two small places in the South of England—one in Somersetshire, the other in Devonshire. If he had continued in the district, he would probably not have been particularly anxious for reform in this matter, because the meters they used there were chiefly of London or Exeter manufacture. The meters were interchangeable in their unions, which was an advantage. On returning to Scotland, it was largely the finding of a different state of matters existing that induced him some years ago to move in the matter.

Mr. T. LIGHBODY (Renfrew) remarked, with reference to the subject of street lighting, that he fancied a good many managers were in a similar position to himself—he had nothing whatever to do with street lighting. He found that incandescent lighting in ordinary street-lamps was not good; the lanterns required to be specially constructed. Some weeks ago he saw in Manchester (which he considered to be the best-lighted town he knew), clusters of three burners, consuming 6 cubic feet per hour. The three burners were lighted till midnight, and then two were put out. Even with the burner which was left, the light was better than with an ordinary flat-flame burner.

Mr. BLAIR said that when they went across the Border, leaving behind them the miserable lights which were in Edinburgh, they began to see an illumination, because they consumed, in some places, 6 cubic feet per hour in each burner. In some towns they had gas of 16-candle power, and in others of from 27 to 30 candle power; but, to look at them, the one seemed to be as good as the other. Of course, the former towns might be burning nearly twice what the latter were.

The PRESIDENT said that in Duns the Gas Company fitted up two incandescent gas-burners at the works, to let the Town Commissioners see what the light was like. The Commissioners were pleased; and the Company agreed to light the Market Square with incandescent gas-lamps, on condition that the Commissioners would maintain the mantles. They would not; and there the matter ended.

This closed the meeting. The members and their friends, including ladies, were then entertained to dinner in the hotel by Messrs. Alder and Mackay. Mr. M'Lusky presided.

PRESENTATION TO MR. BLAIR.

Mr. W. Blair, of Haddington, being about to leave the district for Helensburgh, was presented by his fellow members and friends with a gold hunting watch for himself, and a gold bangle for Mrs. Blair. The watch bears the inscription: "Waverley Association of Gas Managers. Presented to Mr. William Blair, Haddington, by members and friends, to mark their appreciation of his worth. Edinburgh, April 13th, 1899."

The presentation was made by Honorary Sheriff-Substitute J. C. ADAMSON, of Airdrie, who said he presumed it was out of respect to his early and long connection with the Waverley Association that he had been selected to make the presentation. If there was anything in the Evolution theory, Mr. Blair had a peculiar advantage as a man of light and leading. He was born and cradled and reared in a gas-works. His grandfather, his father, and four uncles were all in the gas line in Airdrie, Alexandria, Kilbarchan, and Girvan. He was of the third generation of his family connection who had graduated in the gas industry; and as if to give the Evolution theory every chance, he was now training for a gas manager the coming Blair of the fourth generation. Mr. Blair started to work at an early age—earlier, indeed, than the law would now permit. Commencing in the Johnstone Gas-Works as a message boy, he steadily worked his way up through all the grades of a provincial gas-works; looking after the water-traps, surveying meters, delivering accounts, laying mains and service-pipes, and finishing his career thereby working for two years as a full-fledged stoker. Thereafter he engaged himself as an apprentice engineer with Messrs. Laidlaw, Sons, and Caine, with whom he gained a valuable experience in the construction and erection of the various engineering requirements in gas-manufacturing plant, in the erecting of which at the several works throughout the country he had frequently full charge. His first appointment as a Gas Manager was in 1883, with the East Wemyss and Buckhaven Gas Company, where he remained for about six-and-a-half years, when, on the resignation of Mr. Robb, he was appointed to the managership of the Haddington Gas-Works. During his ten years of office in Haddington, he had reduced the price of gas and remodelled and enlarged the works in all the manufacturing departments to double the capacity they had when he received his appointment; and the results he had been obtaining in his daily working compared most favourably with those at other works which they heard a great deal more about. Mr. Blair was not a man of voluble tongue; but his practical qualifications, combined with his uniformly steady, persistent, and plodding attention to the duties of his office, and the profitable outcome of these, had not been allowed to remain unobserved. Though like all other gas managers he put his light under a bushel before he placed it in the candlestick, the "lamp of the Lothians" had penetrated its rays into the far west, and Mr. Blair had been invited to follow the rays. He took with him to Helensburgh a matured experience in the practical and profitable management and development of a provincial gas-works; and those who had had an opportunity of observing his work in Haddington, would readily predict that he would produce equally good, or even better, results in the larger works at Helensburgh. But they all knew that, though good words might be worth much, they cost little; and his friends of the good old Waverley Association, who had known him longest and best, and who had appreciated his interest in, and contributions to, the various questions which had come before their meetings, desired to convey to him some more substantial token of their regard than mere words.

Mr. BLAIR briefly acknowledged the gifts.

Thereafter the company were, through the kindness of Messrs. Alder and Mackay, driven to their New Grange works, in the West-end of Edinburgh. They were conducted in parties through the works, and saw, among other novelties, a set of pressure-registers, with white metal fittings, enclosed in a handsome mahogany case, which has been constructed for the Newcastle and Gateshead Gas Company. Re-entering the conveyances, the drive was continued to Roslin, where tea was served in the Royal Hotel. The company drove back to Edinburgh, and dispersed in Princes Street.

OHIO GASLIGHT ASSOCIATION.

The Annual Meeting at Springfield.

This Meeting was opened on March 15 by the Vice-President, Mr. E. H. Jenkins, of Buffalo, N.Y., and continued on the following day. Governor Bushnell, of Springfield, who was introduced by the Vice-President as a typical Ohioan, and a representative gas man, eloquently welcomed the Association. Mr. Irvin Butterworth, of Columbus, responded in appropriate terms. The list of applicants for membership was unusually long, and nearly reached 50 names. The Vice-President delivered an inaugural address, first expressing regret that he was called upon to take the place of the late President, Mr. B. P. Holmes, of Youngstown, whose decease occurred during his term of office. He spoke hopefully of the prospects of the gas industry, and said it was on a better and safer footing to-day than at any earlier period of its history. In the course of some remarks on acetylene, the price of calcium carbide was quoted at about £20 per ton; so they need not fear competition. On the subject of municipal ownership, he thought that city officers were not always qualified to work a gas-works to the best advantage; and that the popularity of the movement was chiefly based on misrepresentation. Accurate statements of the results of the working of municipal undertakings in the United States, prepared by an independent Committee, would show that in 99 cases out of 100 the citizens would save money by making fair contracts for such service with private companies. Many gas companies were now demonstrating the fact that they could furnish a better and cheaper means of street lighting, with the aid of incandescent burners, than could be supplied by electric companies.

Mr. C. W. Andrews, of Hamilton, read a paper on the construction of a concrete gasholder-tank, 83 ft. 6 in. diameter and 22 ft. deep, on a good sand and gravel foundation. Calculation showed that, allowing 100 lbs. tensile strength per square inch, a wall 2 feet thick at the bottom, tapering to 16 inches at the top, would be strong enough to resist the water pressure above the centre without back-filling. The excavation was made with a slope of 3 to 1; and it passed first through 5 feet of loam, after which a bed of sandy gravel was reached. As a means of preventing caving, the sides of the excavation were thoroughly slushed with neat cement grout. Quite sufficient sand and gravel were obtained from the spoil to make the concrete; and it was washed by being passed over a ¼-inch screen, placed at an angle of 45°, upon which a number of fine jets of water played. In this way, clean gravel and sharp sand were obtained; and the concrete was composed of one part Portland cement, three of sand, and seven of gravel. This was mixed in the usual way, and laid in layers of about 6 inches thick, in wooden moulds three feet high, which were lifted 2 ft. 6 in. at a time, as the work progressed. The weather during the erection was bad, with severe frosts, which necessitated the use of 20 salamanders to prevent injury from freezing. Electric lights were used at night; and the whole of the concrete, which amounted to 700 yards, was laid in 204 working hours. The inside and top curb received a rendering ½ inch thick of 1 : 2 cement and sand, and then an additional wash of neat cement was applied by brushes. The centre was excavated to a slope of about 1 to 2, and covered with concrete one foot thick. The tank gave no trouble from leakage on filling. A slight weakness was reduced by the use of bran to "no more than in a brick tank of the same dimensions;" and the cost was only about two-thirds that of a brick tank.

Discussion being invited, Mr. Donald M'Donald asked why the author did not use American cement instead of Portland, even if he had to make the walls thicker. He could have protected himself by specifying for cement of a certain strength. Mr. Cline observed that "arc lights were used to properly light the work." Mr. Whysall thought it would have been better to use a little more cement and so do away with the leakage that had to be stopped by means of bran. Governor Bushnell thought it was not a question of first cost so much as durability. Brick and cement would crack sometimes after several years use in an unaccountable way; and he favoured steel tanks. Mr. H. L. Doherty remarked that the only recent accidents with tanks were three in number, and all occurred with steel tanks. Concrete

was gaining favour as being strong, and easily and cheaply made without skilled labour. Mr. J. A. Mayers thought that putting cement upon the sides and bottom of the excavation was simply throwing money away, as it would not bind with unwashed gravel. Mr. Cressler remarked that broken stone made a better aggregate than gravel and sand, to which Mr. Doherty agreed. The President understood that the author had material on the site which he wished to utilize, and that was why he arranged to use gravel and sand.

Mr. Andrews, replying to his critics, said he used Portland cement because he could depend on its quality. Local cements varied in quality; and the brand he used was made in New York. Portland cement would stand frost after being once properly set, while the local cements did not. The concrete itself was not intended to be watertight—he depended on the rendering for that; and the rendering was necessary in any case. Concrete had a decided advantage over brickwork both in strength and durability. It was quite five times as strong, and if anything improved in strength with age. The whole bottom surface was thoroughly saturated with grout before laying the concrete. He preferred gravel and sand to broken stone, as it gave a more solid concrete.

A paper dealing with the "Uses and Preservation of Distribution Records" was read by Mr. J. A. Mayers, of Columbus. He recommended reproducing copies of a tracing made from the published surveys of the district on a small scale, by one of the processes that give black lines on white paper, and also a second tracing prepared by drawing lines parallel to and outside the road boundaries so as to give a greater width to the streets. These could be used for a large variety of purposes, such as for a complete main outline map, the various sizes being indicated by various combinations of dots and dashes, or by figures; for a trunk main map showing the chief distributing lines of main only; for syphons and valves; for showing the different kinds of pavement; and for following the course of work in progress, with the aid of pins of different colours. These maps should be mounted on stiff cardboard, and the edges bound with cloth. A rack for storing these maps was described, including a number of wires mounted in a frame supported in a horizontal position. One wire is provided for each map; and as the frame is twice the length of a map, any desired sheet can be slid out for inspection without disturbing the others. The arrangement admits of the maps being secured by lock and key. A second series of maps should be on a large scale—say about 50 feet to one inch; and these should be bound in sets. They are intended to show details, such as the position of mains, syphons, valves, &c., in the streets; and the construction of a cupboard or case for storing them was also described. All syphons should have a distinctive number; and a form for recording full particulars of the date when they are pumped, quantity of liquid taken out, &c., was submitted. Suitable forms for the use of the workmen were also exhibited. A series of forms for recording new mains laid, new services laid, and repairs, next claimed attention; also investigation forms, giving the particulars required respecting new applications, such as name, address, quantity of gas proposed to be used, length and position of service required, &c. The work done in laying the new service, materials used, quantity chargeable to the consumer, and so on, should be recorded on a special form. All these forms should be filed in order in boxes specially constructed for the purpose. Books for recording time, materials used, or wanted were also described, specimen forms being exhibited in each case; and full details were given as to posting up the ledgers, and the system of working the books and forms described.

The nature of the paper did not leave scope for discussion; but several members referred to it in appreciative terms.

Mr. Henry L. Doherty, of Madison, Wis., next submitted "A Bunch of Short Topics for Discussion." He dealt first with considerations as to the economy of fuel in the retort-house. In some cases cheap coal, fed by mechanical stoking, could be used with advantage, the coke being reserved for sale or for water gas. He regarded the usual practice of allowing the products of combustion to escape at a temperature sufficiently high to create a draught, as being wasteful; and spoke in favour of carrying recuperation to a greater degree, and using forced draught. Both in the boiler-house and retort-house fuel was used wastefully; and a consideration of the whole question was one of the best opportunities for economy at present available in a gas-works. Gas men should be prepared to use coke, coal, or tar for fuel, according to the state of the market. He next proceeded to argue that purifier-houses were unnecessary; referring to the practice adopted by Mr. Donald M'Donald at Louisville, Ky. If protection against cold was required, it could be provided in a cheaper way than by building a house over the boxes. The conducting or delivering power of main pipes was the next topic; reference being made to the erroneous impression that the delivery is proportional to the area, and the absence of any general rule for determining the proper size for a main or service. He held that the present distribution methods, based on tables generally accepted, were wrong; and that if gas engineers were thoroughly conversant with the cost of distributing a unit of gas, the system would be radically different from that in general use. Very large feeding mains should be carried to convenient centres, from which the distributing mains should radiate. These points were illustrated by tables and by examples from practice. The last subject was "Question of Supply Pressure;" the author advocating liberality in this respect, seeing that insufficient pressure was a frequent cause of complaint, while leakage would only increase in proportion to the square root of the pressure.

Discussion being invited, Mr. Chollar related his experiences at St. Louis some years ago in using rough, cheap coal for his retort-house fuel. He agreed with the suggestion that recuperation could be profitably carried out to a much greater extent than had yet been accomplished. As to the accepted formula for the flow of gas through pipes, he argued that the Almighty ran the universe on nothing higher than the third power, and that any formula involving the use of higher powers could be regarded with suspicion. Mr. Lynn failed to see how it was possible to lay down rules as to the maximum consumption per consumer, or to get accurately at the maximum consumption in a given time. It was well to speculate as to the methods of laying entirely new systems; but many of the members had to do with systems already laid that could not be altered on account of expense and other reasons. As to the flow of gas, a high authority had stated that the flow was exactly proportionate to the square of the diameter of the opening, and the square root of the pressure. Mr. M'Donald said that applied to orifices and not to pipes. Mr. Butterworth said that at Columbus the maximum consumption per consumer was about 15 cubic feet per hour; and Mr. Andrews said that, in his case, it was just over 20 feet. Mr. Mayers thought the best way was to exercise foresight in laying mains, and allow a good margin for the future.

Mr. Doherty replied at some length. In illustrating his point as to the prevalent ignorance on the best methods of distribution, he instanced the common practice of laying two 6-inch pipes, one on each side of the road. By laying an 8 and a 4 inch, or a 10 and a 2 inch, and connecting by cross branches at frequent intervals, a much larger quantity of gas could be distributed with no greater cost for the plant. He admitted that the consumption per consumer was largely a matter of guesswork; and he had introduced the subject in the hope of getting a little light thrown upon it. The biggest send-out he had heard of was 30 cubic feet per consumer per hour. He quoted examples to show that unnecessarily large mains were at times put down, as well as small ones; and argued that the given quantity of gas could be efficiently distributed at a much less cost for mains. He also pointed out the difference between the flow through orifices and through pipes, such as the retarding effect due to friction. It was true many of them could not relay existing mains; but they all had to consider the question of increasing the supply to certain districts, and he wanted to get at the best and cheapest way of doing it. It was not the average consumption per hour, but the maximum at any one moment that they wanted to get at. He enlarged on the difficulties and loss of business due to insufficient pressure, which were much more prevalent than some seemed to think.

(*To be continued.*)

REGISTER OF PATENTS.

Cylinder Coolers for Gas-Engines.—Garner, J., of Tyldesley. No. 6938; March 22, 1898.

This invention relates to the construction of a cylinder cooler for gas-engines when used for propelling motor cars and for other like purposes; the principal object aimed at being to dispense with the necessity for carrying a large supply of cold water for keeping the cylinder cool.

The arrangement consists of a jacket or casing of thin sheet-metal, or other suitable material, surrounding the cylinder, provided with an open bell or trumpet-shaped mouth at the front, and with a conical escape-pipe at the rear. Into the latter the nozzle of the exhaust-pipe or passage from the working cylinder is carried, and directed rear-wards, so as to create a forced draught of air through the jacket.

Burners for Incandescent Gas Lighting.—Marmuse, M., of Mons, Belgium. No. 7424; March 28, 1898.

This invention, relating to incandescent gas-burners, has for its object to produce "a new burner of this kind with a blow-pipe, which feeds it with air or any other combustion-promoting gas compressed by special appliances, and intended to increase the illuminating power and heating power of the flame."

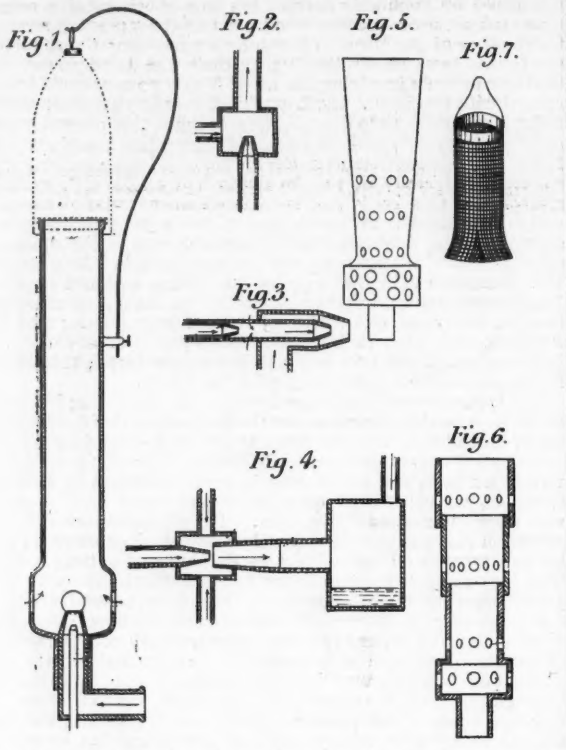
With the burners used up to the present time, the patentee remarks, the combustion of the gas takes place in a very imperfect manner in the surrounding atmosphere, on account of the insufficient quantity of oxygen furnished to the flame, which gives only a yellow flame of low illuminating power, and which besides liberates (in the form of smoke) many particles of unburned carbon. With the burner which is the subject of the present invention, "the combustion of the gas is complete, and consequently the illuminating and heating power of the flame is considerably increased."

This result is produced by injecting into the illuminating gas, in proportion to its consumption, a sufficient quantity of some oxydizing and combustion-promoting gas (which generally is air compressed for the purpose by special apparatus, and mixed with the illuminating gas) by means of a blow-pipe, which is an integral part of the burner.

Fig. 1, p. 978, shows a section of the bunsen burner provided with an incandescent mantle and a blow-pipe. Figs. 2 and 3 are detail views (in longitudinal section) of other forms of construction of the blow-pipe. Fig. 4 shows an application of the blow-pipe differing from the preceding ones. Figs. 5 and 6 show modified bunsen burners. Fig. 7 shows the patentee's special form of open-top mantle.

The claims for the invention (so far as the burner and mantle are concerned) are: 1. In a burner for lighting with gas by incandescence, the combination with the burner and incandescent mantle of a blow-pipe

placed at the lower part of the burner, so as to bring into the latter any burning gas or air under pressure, and which (with or without the aid of the surrounding atmosphere) produces complete combustion of the combustible gas drawn into the blow-pipe by the air under pressure. 2. In a blow-pipe for a gas-burner, the combination of two concentric tubes; the external one bringing air or other burning gas in a state of compression,



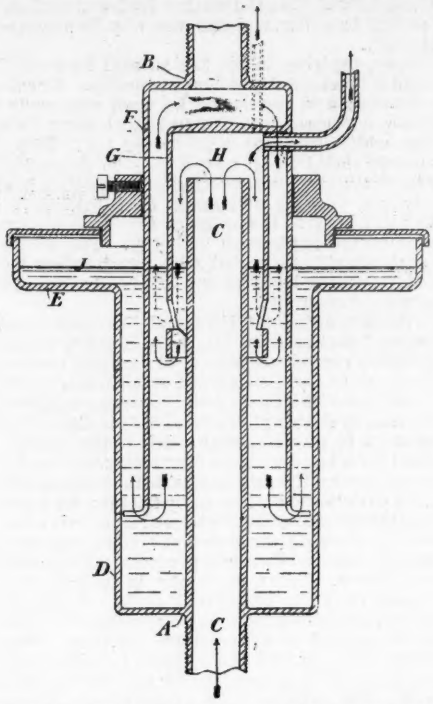
and the inside tube conducting the combustible gas sucked in by the burning gas. 3. A bunsen burner with a widened tube, or a tube formed of successive tubes coupled at the ends of one another, and increasing in diameter from the lower to the upper one; the burners having several series of draught-holes, or being quite without them. 4. In a burner for lighting with gas by incandescence, the combination with the burner proper of an incandescent mantle open at the top.

Automatically Lighting and Extinguishing Gas-Lamps.—Hahn, T., of Kötzchenbroda, Saxony. No. 8072; April 5, 1898.

This device for enabling a whole system of lamps in a street, town, or works to be lighted and extinguished from one controlling centre, is composed of "adjustable stationary parts, which can be fitted so as to form a continuation of the gas-feed pipe at any convenient point between the main and the burner;" and the action of the device, after it has been adjusted to a given pressure, is such that a raising of the pressure within the gas-main over the given point causes the lights to be lit, while a decrease of pressure causes the gas-feed to be cut off, and consequently the lights to be extinguished. The moveable agent which cuts off or opens the gas-feed is mineral oil; and it is the hydraulic action of this fluid, together with such a form of adjustable device as enables the hydraulic action to take place without any lessening of the gas pressure, and allows of the hydraulic balance being adjusted to different degrees of pressure at different points on the same main, which forms the principle of the invention.

The form of device shown is circular, and consists of two essential parts—an under part or receptable A, and an upper part or double bell B. The under part is formed of a portion of gas-pipe C, to which is attached a vessel D, having a saucer-like top E, so that the displacement of fluid within the chamber only slightly affects its level. The space between the pipe and the outer shell of the vessel is filled with mineral oil. The upper part of the device consists of two tubes, one within the other; the inner tube G being about half the length of the outer one F. The tubes are fastened together in such a way as to have between them all round a chamber which communicates with the burner. When the double bell B is telescoped on to or into A, three compartments are obviously formed—communicating at different levels; and if the vessel D has been filled with fluid, three fluid columns are likewise formed. In telescoping the double bell on to or into the under part of the device, the latter can be stopped and secured at any point desired. In other words, the upper part is vertically adjustable, and can be so adjusted that the under end of the inner tube G is near to, or at a distance from, the fluid-level. There is an annular clamp or ring, which grips the outer tube F, and which can be tightened or loosened by means of a set-screw; so that when the clamp is made tight, the upper part of the device cannot descend further into the under part. N is a lid with which the widened or saucer-like portion E of the vessel D is provided to keep out dust and dirt; and R is the turned-up end of the longer tube F, which acts as a guide, and prevents the upper part of the device having play within the lower part.

Now assuming that the vessel D has been filled with as much fluid as is required, and that the upper part B has been telescoped into or on to the under part of the device up to a point desired, and made fast by the annular clamp or ring, the device is ready for work; and its action is as follows: The gas passes along the pipe C, and arrives in the upper part of the compartment H. Thence it descends towards the fluid-level, which will be at a greater or less distance from the under end of the inner tube G. The greater the distance, the greater the gas pressure required to force the fluid below the end, and hence upwards in the compartment I. Immediately there is sufficient gas pressure, the fluid is forced downwards; and, as the compartments communicate, the fluid descends along with it until there is a free space between the fluid-level in the under portion



of compartment I and the end of the inner tube G. Gas will then pass along the free space, upwards through the upper portion of the compartment I, and to the burner. The gas supply to the burner will be kept up in this way until the pressure in the main is sufficiently decreased, when the weight of the fluid in J, having more power than the gas pressure, will raise the fluid columns to their original positions, and thus cut off the gas-feed.

Automatic Apparatus for Producing Acetylene.—Lacroix, P. A. M., of Toulouse, France. No. 8565; April 12, 1898.

This invention consists mainly of the application of a hydraulic lever (with a water-feed independent of the gasholder) to the circulation of water in one or more generators of any kind whatever, and in this respect is a modification of patent No. 4761 of 1897. In the arrangement there described, the syphon and the gasholder are in constant communication as regards pressure, but not in a hydraulic sense. The holder water plays an essentially passive part; having no other object than that of serving for the storage of the gas, and regulating the circulation of water in the generators by communication of pressure. It is the syphon, and consequently the reservoir that supplies it, which serves for the production of the gas. From this combination, as was explained in the earlier patent, it results that the small arm of the lever thus created is at the regulating point—that is to say, at the gasholder – and the large arm at the point of circulation—that is, the syphon. Such a system has many advantages, the principal of which are: First, very great accuracy in working, affording the most perfect safety; second, the height of the column of water is in no way arbitrary, and the perfect working of the apparatus is always assured, even though the level of the water in the feed-tank may vary considerably. It is in this that the invention consists; and this is the principle claimed.

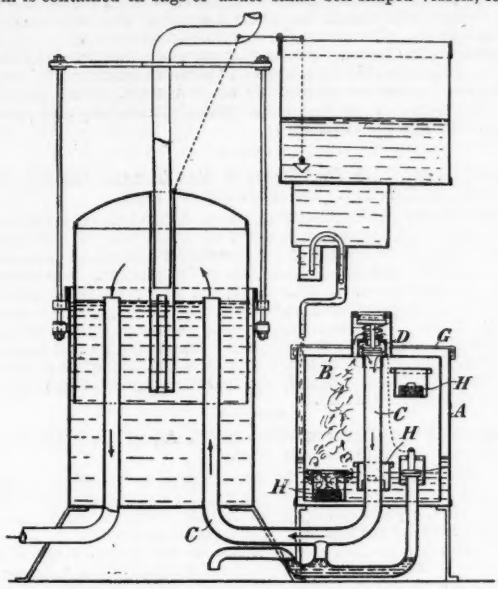
Acetylene Generator.—Graetz, A., of Berlin. No. 8675; April 13, 1898.

This acetylene generating plant consists (generally) of two generating vessels, which are alternately placed in use; of a water-tank to supply water to the carbide; and of a gasholder, the movement of which is caused to control the water supply. This latter is so regulated that, at the moment when one generating vessel is entirely exhausted and filled with water, the water service is automatically transferred to the other generator.

The generator consists of a vessel A, closed by a bell B immersed in water. Under the bell is a pipe C, to conduct the gas generated under the bell. This pipe has at its upper end an extension D, in the interior of which is a double valve operated by springs. The valve is so arranged that, when not weighted from the top, it closes the inlet of the gas-pipe, in consequence of the action of the spring shown. This entire valve-device is located in a dome-shaped portion of the generating holder, having an opening at the top, closed by the top part of the valve when the bell is pressed down by rods G in any suitable manner. Thus, when the bell is lifted for cleaning or refilling the generator, the opening of the pipe C closes automatically, and the air-aperture of the top portion of the bell is opened, so that air can enter the generator; while when the bell is pressed down by the rods G—*i.e.*, when the apparatus is in working condition—the opening at the top of the holder is closed, and the aperture of the pipe C will then be opened. Under the bell B are the carbide vessels H, arranged in tiers or stages; so that, when the surface of the water gradually rises under the bell, one carbide vessel after another will generate gas.

The carbide vessels consist of cylinders closed in at the bottom, and

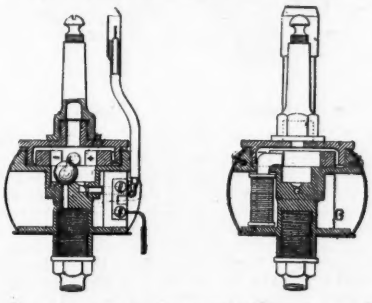
with overlapping covers, so as to protect the carbide against the influence of the moist air before the vessels are filled with water. When the water rises, the covers float. The covers have further the advantage that they force the generated gas to be washed by the water, while the gas passes around the edge of the cover, and is thus subjected to a kind of cleansing process, whereby the greater portion of lime dust which may have been carried away by the gas is held back. Within the carbide receptacle the calcium is contained in bags or under small bell-shaped vessels, for the



purpose of keeping the formed lime together as far as possible. Under the bell is further a water discharge, closed by a valve, the valve to be lifted by a chain, when the generator is opened. The water supply takes place alternately to one or other generating vessel, while each time the one generator which is not in use is recharged with carbide. The changing of the water supply from one generator to another takes place automatically at the moment when, as already indicated, the generating vessel last in action becomes entirely filled with water, and therefore exhausted.

Turning On, Lighting, and Extinguishing Gas from a Distance.—Guyenot, P. L., of Aix-les-Baines, France. No. 9482; April 25, 1898.

This invention relates to apparatus for freeing, lighting, and extinguishing gas-burners at a distance by means of electricity, and more particularly to the apparatus described in patent No. 29,244, of 1897, with the object of rendering it of simpler and more economical construction, as well as of "absolutely certain or reliable working."



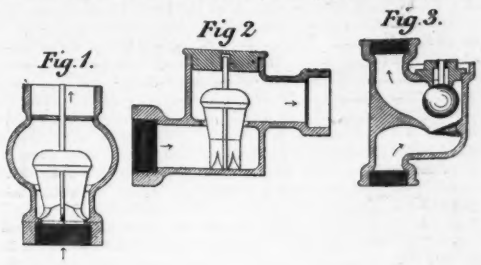
As shown, the apparatus is characterized by the combination of a closed chamber in communication with the service-pipe by means of a tube, and with a gas-burner through a small pipe. The jack-light communicates with the chamber, and is furnished across its orifice with a platinum wire. There is a cap or ball capable of being located in the seat which terminates the gas-tube, or in the seat of the pipe leading to the jack-light. The electro-magnet is situated in an electrical circuit within which is placed any suitable commutator or switch for reversing the current; while there is a circular permanent magnet, whose magnetism is opposite to that of the core of the electro-magnet.

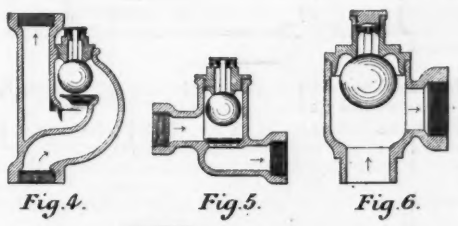
Cutting Off the Supply of Gas to Buildings in Case of Fire, &c.—Penman, A. H., of Blyth. No. 9745; April 28, 1898.

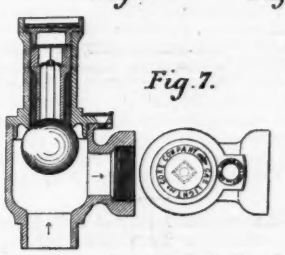
This invention has for its object to provide a means or safety-device whereby, in case of fire in a building, the gas supply thereto shall be automatically cut off at the parts adjacent to the fire.

The invention can be carried into practice in various ways, several of which are shown in the engraving. The valve employed is of any suitable type, though illustrated of the mitre form in figs. 1 and 2, and of the ball kind in the others. Access to the casing, for the inspection, repair, or renewal of its contents, is provided by a removable cap or plug, except in fig. 1, where it is obtained by breaking the joint at either extremity or both. Normally the valve is always open, in which position it is supported either from below (as in figs. 1 and 2) or from above (as in the other figures), by a strip of fusible metal composed so as to melt when the temperature of its surroundings exceeds the normal to a reasonable extent. In practice, the metal known as "Wood's Fusible Metal" is found suitable—melting, as it does, at 140° Fahr., and being composed as follows: Bismuth 4 parts, lead 2 parts, tin 1 part, and cadmium 1 part.

The construction illustrated in fig. 7, besides serving as a safety-device is specially applicable for enabling the gas supply to be temporarily cut off from a building or any particular part of it—when vacant, for instance—without recourse to the usual expensive practice of breaking joints. To this end, the cap or plug is prolonged, and the prolongation is screwed internally to receive the correspondingly threaded part furnished



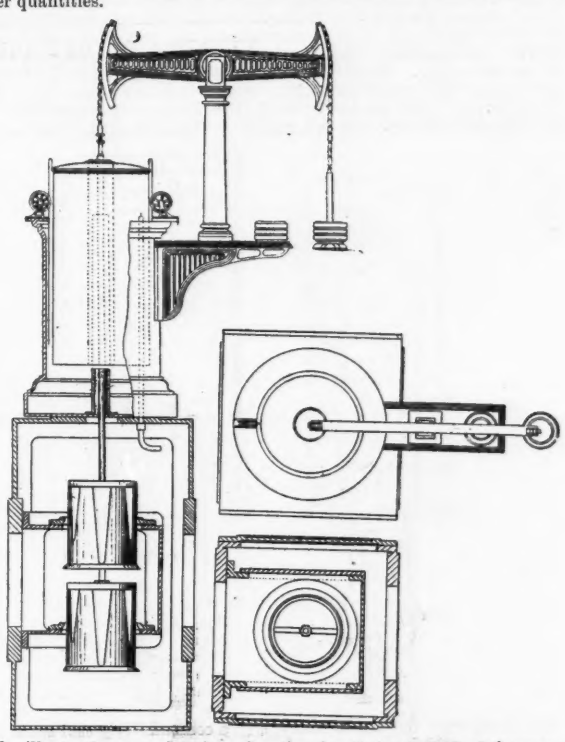




with a square aperture. Thus, when it is desired to shut off the gas, the cap is removed, and the threaded part screwed downwards by a key fitted into the aperture until the valve is firmly bedded on its seat, so as to effect the necessary closure. The cap is thereupon replaced, and sealed as indicated in the plan.

Gas-Regulators.—Hawkyard, J., of Saddleworth, and Braddock, J., of Oldham. No. 10,351; May 6, 1898.

The objects of this regulator for governing the pressure in a gas-supply main are "to combine compactness of construction and adaptability to varying conditions of position and available space, with accuracy in action, and also to compel the valves to travel a considerable distance to supply a small quantity of gas in proportion to their motion when supplying larger quantities.



The illustrations consist of an elevation (partly in section) of the regulator, a plan, and a horizontal section taken through the valve-chamber. There is the usual gas-chamber, in which a second similar chamber is

cast or fitted. The inner chamber is provided with two valve-seatings (loose or otherwise) one above the other, and two valves on one spindle on the well-known principle of the equilibrium valve—both valves opening and closing simultaneously. The sides of the apparatus are preferably removable and common to both chambers, so that the valves and seatings are easy of access. If of cylindrical form (preferred), these valves are each closed at one end and open at the other; and in the periphery of the cylinder there are slots lengthwise—that is to say, in the direction of the axial line thereof. Each slot is preferably made in the form of an isosceles triangle (or similar form), with its apex or pointed end towards the closed end of the valve. There may be any number of these slots in the cylinder, commencing at or about the same distance from the open end. One extends nearly to the closed end; but the others, being shorter—say, by about 3 or 4 inches, according to the size of the governor—will not open to allow gas to pass so soon as the longer slot. In this way, the valves and spindle must travel a considerable distance to supply a small quantity of gas, and need not move so far in proportion to supply larger quantities. On the top of the outer gas-chamber is a water-tank, in which works a bell or holder attached to the valve-spindle, which passes through a central sealing tube and actuates the valves in the usual way. In order to ensure a minimum and unvarying amount of friction in this valve action, the two valves and their adjuncts are counterbalanced, by suspending them from the arc or end of a beam supported on knife edges or other anti-friction bearings, by a suitable pillar, and adequately weighted at its other end.

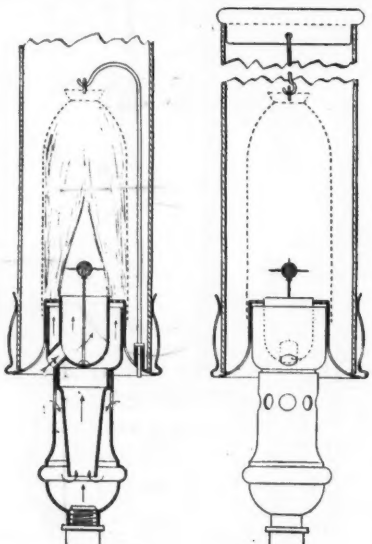
Burners for Gas-Fires.—Yates, H. J., and Prior, J. D., of Birmingham. No. 13,651; June 20, 1898.

The claims made for this invention are: 1. A duplex or multiple gas-burner, consisting of two or more separate sections or body parts, each provided with a series or set of burner-nipples or half-nipples, and independently supplied with gas by a separate gas-way, with the whole of the gas-ways controlled either by a single tap or cock, or by independent taps. 2. A duplex multiple atmospheric gas-burner, consisting of two or more superimposed sections, each provided with a separate set or series of burner-nipples or half burner-nipples, and independently supplied with gas; the whole of the gas-supply pipes or passages being controlled either in common by a single tap or plug, or by separate taps or plugs. 3. A duplex burner, consisting of two superimposed sections or parts, with their flat sides coming together, and provided respectively with a set or series of D-shaped or half-round nipples, also with their flat sides opposed, with each section having its independent gas supply, while the relative positions of the parts are assured by lugs and stops.

Maintaining the Catalytic Property of Bodies Used for Igniting Gas.—Schultze, K., of Berlin. No. 26,966; Dec. 21, 1898.

The patentee remarks that the cause for the early ceasing of the catalytic property of igniting-bodies (for instance, in the shape of pills, threads, wire, &c., for incandescent gas-lamps) that commence glowing in a current of gas, lies either in the precipitation of non-catalytic bodies—such as cerium, soda, thorium, carbon, and the like—upon the igniting-body, or in the evaporation of the platinum-atoms (if this element is employed as the igniting-body) under the heat of the glowing incandescent body, where made use of.

In order to do away with these drawbacks, and so prevent the igniting-body from being covered with a non-catalytic precipitate, and if the body consists of platinum to protect the latter against evaporation, it is proposed to maintain in the interior of the flame, or in the case of an incandescent lamp in the interior of the incandescent body, a space that contains, besides the igniting-body, nothing but atmospheric air. In other words, there is formed (as shown by the illustration) in the interior of the flame or of the incandescent body a core or cone of air, preferably a very short distance over the burner-head; and the igniting-body is arranged in this core or cone of air. The latter being continually fed with fresh air from below, and from the mantle-surface of that core or cone, air flows continually to or against the inner side of the cylindrical or conical flame, or the incandescent body. There is maintained by this means in the interior



of the flame, or of the incandescent body, a comparatively cool space, in the interior of which the igniting-body is located. The latter is consequently being continually cooled, whereby the constant glowing of the body is prevented, and the duration of the catalytic property of it is greatly prolonged. In fact, the catalytic property of the igniting-body is completely maintained for any length of time, because the air in the core or cone in question is incessantly renewed; so that there is a constant current of air by which the vapours given off from the glowing incandescent body are constantly blown away from the igniting-body, and by which also the heat of the flame, or of the incandescent body, is constantly removed.

The core of air exists as such, of course, only during the burning of the lamp, because prior thereto the whole interior of the incandescent body is filled with air. On opening the cock, however, the igniting-body is first exposed to the gas issuing from the burner; and at the moment of contact between the gas and the igniting-body, the latter commences glowing, and the gas or the mixture of gas and air is ignited. There then forms instantly the core of air that envelops the igniting-body and protects it against any injurious influences.

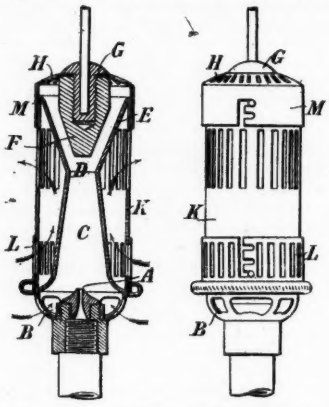
Lighting Device for Incandescent Gas-Lamps.—Himmel, G., of Tubingen, Germany. No. 1235; Jan. 18, 1899.

This device for lighting incandescent gas-lamps (with a graded or progressive lighting adapted to ensure the certain lighting of the lamp free from shocks) is characterized by a horizontally revoluble tap, arranged on a fixed tap-body forming a prolongation of the gas-pipe. The tap proper has an internal recess or groove adapted to communicate with three radial and elbow passages formed in the tap-body, in such a way that, after the lighting torch has been inserted between a fixed piece and the moveable arm or lever of the tap proper, the lamp-pipe and progressive igniting-pipe are opened, so that the lamp is lighted; while on the torch being moved further sideways, the pipe to the progressive lighting-device is again immediately closed.

Incandescent Gas-Burners.—Bachmeyer, A., of York Street, Westminster. No. 2179; Jan. 31, 1899.

This invention relates to a burner designed to "obtain an intimate mixture of air and gas in suitable proportions to produce a flame of great heating power, especially adapted for heating to incandescence a refractory mantle for the purpose of producing brilliant light."

A is the inlet for gas, which issues in one or more jets directed upwards; B are the air-inlets; C is the mixing-tube tapering to a smaller diameter to the neck D, whence ascends a tube E tapering to a larger diameter at the mouth, which is of annular form surrounding a metallic conducting core F. Into this core is screwed the stem of a cap



G, which fixes on the mouth of the tube E an annular disc H of wire gauze or perforated metal, or it may be a disc having its circumference like a toothed wheel—the mixed gas and air issuing in jets between the teeth. The annular area at the top of the conical tube should be about double the circular area at the neck, while the height between the inlet A and the base of the tube C is adjustable to suit various pressures of gas, as is also the height of the core F in the tube E. The burner is enclosed within a tubular casing K, to which the tubes C and E are attached; the casing being fitted to slide in the socket L of the base and in the socket M of the upper part. The casing has perforations at its lower and upper part, through which air can circulate after being heated before it ascends to the space surrounding the flame.

APPLICATIONS FOR LETTERS PATENT.

7068.—Headley, St. J. B., "Acetylene-lamps." April 4.
7099.—Thinault, A. E., and Dreyfus, M., "Acetylene-lamps." April 4.
7108.—Schwarz, I., "Acetylene-lamps." April 4.
7124.—Conrad, O., "Incandescent gas-burners." April 4.
7144.—Schultz, H., "Regulating the condition of gases and liquids." April 5.
7200.—Geisseler, G., "Acetylene gas-burner." April 5.
7210.—Brearley, J. H., "Regenerative furnaces for heating gas-retorts." April 6.
7213.—Warren, F. J., Brecknell, H., Munro, E. M., and Rogers, H. I., "Valve for liquids and gases." April 6.
7219.—Crossley, W. J., and Hulley, R. D., "Internal combustion motors." April 6.
7220.—Crossley, W. J., and Atkinson, J., "Internal combustion motors." April 6.
7221.—Crossley, W. J., "Internal combustion motors." April 6.
7232.—Barnett, C., "Acetylene-gas generators." April 6.
7303.—Lewis, T. H., and The Lux Syndicate, Ltd., "Generating acetylene." April 7.
7310.—Reynolds, S. H., and Murphy, A., "Acetylene-gas generator." April 7.
7325.—The Read Holliday Acetylene Company, Ltd., Cardno, W., and Read Holliday, "Generating acetylene gas." April 7.
7374.—Kinsey, H., "Generating and storing acetylene gas." April 8.
7393.—Hall, R. F., "Internal combustion engines." April 8.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Metric System.

SIR,—While thanking you for your valuable "Editorial Notes" on my previous letter, and for directing the attention of your readers to so important and instructive a subject as the metric system, I should like to remark upon a few points raised, without wishing in any way to get up any "nice little controversy."

As the question of metrical currency had not been raised in the article of March 28, I purposely avoided touching upon it, or upon questions connected with it—as, for example, alterations in price per cubic metre of gas. With our coinage remaining as at present, and gas being sold by the cubic metre, I do not see why the alterations in price should not be made by fractional parts of the penny, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$. These alterations are of daily occurrence for stocks and shares; and they could be employed equally easily for variations in the price of gas. But, of course, any adoption of the metric system should be thorough, and should apply not only to weights and measures, but also to currency, exactly as was done in Germany but thirty years ago.

It is surely no reflection on the metric system to admit that the term "half-kilo" is found more convenient than "500 grammes." In Italy (at least Northern Italy), one generally buys by the *etto*, or 100 grammes. Such terms are used for verbal convenience only, and are not violations of the metrical law. In fact, they simply show what pliability and practicality there may be under the metric system, without causing such bewildering confusion as we suffer from at home. The same may also be said of the popular nomenclature of the coinage, though it may be information to know that the Italian halfpenny is more frequently referred to as *cinque centesimi* than as a *soldo*. It is only by the most ignorant and lowest class of retailers that such terms as *soldo* and *sou* are used; and it is but an illustration of the hardihood of such long-established words.

I think we need hardly trouble ourselves as to what the butchers of Smithfield would do if the Government were to attempt to force the metric system upon them. Once made compulsory, they would very soon find out the advantage of selling by the kilo instead of by the stone of 8 lbs. But more important than this is your acceptance of a "Times" correspondent's dictum, "that no nation ever accepted the metric system by the common consent of the people." This you are pleased to call "the truth in a nutshell." Even with the widest franchise, it is very difficult to establish what is "the common consent of the people." But I might reply that in England we have already this "common consent." Is it not shown, as far as it can be, by the favourable resolutions adopted by scores and scores of Town Councils, Trade Councils, School Boards, Chambers of Commerce, and other public bodies? Poll all these institutions to-day, and what would be the result? Undoubtedly, an overwhelming majority in favour of the near adoption of the metric system.

But if there is not "the common consent of the people," what then? How many valuable reforms would be delayed if the common consent of the "hydra-headed multitude" were waited for? Is it not rather the privilege and duty of the educated minority to lead and force beneficial measures upon the ignorant majority? And how can there be any doubt that the educated minority is practically a unanimous one in this instance? It is led by the Select Committee of the House of Commons, appointed in 1895, who recommended, with only one dissentient, "that after a lapse of two years the metrical system be rendered compulsory by Act of Parliament." It is supported by the Right Hon. A. J. Balfour, who has said: "There can be no doubt that the judgment of the whole civilized world, not excluding the countries which still adhere to the antiquated system under which we suffer, has long decided that the metric system is the only rational system." The British Chamber of Commerce in Paris, and many other Chambers of Commerce, are strongly in its favour. British Consuls all over the world have reported that our trade is at a disadvantage owing to the non-adoption of the metric system in calculations of weight, cost, &c. And lastly, in this circle of educated minority, may I include the "JOURNAL OF GAS LIGHTING," which has said: "There is no valid reason why England should cherish an antiquated system of weights and measures unintelligible to the rest of the civilized world, and anything but convenient to those who use it"?

Although it is not a matter of much moment, I should like to point out that I did not ascribe, as asserted, "the loss of British trade to American competitors as connected with our adherence to the old English system of weights and measures." I merely wished to draw attention to the fact that to-day the British Lion is bearded in his own den. Thus I hoped to emphasize the severity of the competition which England has to face, and to indicate the advantage there would be in speaking that common commercial language of the metric system, which is spoken by the vast majority of our business clients.

C. E. BRACKENBURY, Assoc.M.Inst.C.E.
Continental Union Gas Company, Limited,
7, Drapers' Gardens, E.C.
April 13, 1899.

Sulphate Working at Widnes.

SIR,—Without doubt, your correspondents on the above subject will allow the fact that sulphate manufacture comes under the head of Practical Science. But Science is an exact study; and this fact, coupled with the axiom: "Matter is indestructible," leads me to think that sulphate manufacture in many gas-works is anything but an exact study, and that the truth of the first great principle of Chemical Science is somewhat questionable.

Your correspondents know full well what the theoretical analysis of pure sulphate is. With Mr. Carr, I agree that this equivalent is a thing to be aimed at; and although it is impossible to manufacture the pure salt with the apparatus, &c., commonly at our disposal, why should we not know the exact composition of the article we do produce. This knowledge would soon bring to light any loss of acid, and eventually lead to the real cause of same. Sulphuric acid is a most stable compound, and is in no way volatilized or "spirited-away" in its chemical combination with ammonia.

Sulphate, as a rule, is purchased as 24 per cent. merchantable; and any excessive percentage of free acid is detrimental to the sale of the salt. But at the same time, sulphate is not usually manufactured containing more than a fractional percentage of free acid, even though many of the plants in use are quite out of date.

A few details taken from my practical experience may be of interest, as proving that it is quite possible to make a ton of commercial sulphate with less than the theoretical weight of acid, and without the aid of a modern plant or superheater.

	Cwt.	qrs.	lbs.	
Sulphuric Acid used, 149° Twaddel, and practically free from impurities . .	17	1	7	per ton of sulphate.

Analysis of Salt Produced.

Combined NH_3	24·23 per cent.
Combined H_2SO_4	69·83 ,,
Free H_2SO_4	·28 ,,
Moisture, &c..	5·66 ,,
	100·00

The temperature of the liquor at the inlet of still averaged 119° Fahr., and these figures are relative to twelve months' working; the yield of sulphate, over this period, being upwards of 30 lbs. per ton of coal.

HAROLD DAVIES,
Assistant Manager.
Gas-Works, Colne, April 15, 1899.

SIR,—I have no desire to continue the discussion on the above subject; and this will be my last contribution. But, in justice to myself, I feel bound to say that it is somewhat unworthy of Mr. Carr to accuse me of want of experience or thoughtlessness, because my statement of absolute facts does not accord with facts which have so far come within the range of his own experience.

But for Mr. Carr's claim that, with a new form of superheater, he was able to work with only 17½ cwt. of *chamber acid* per ton of salt, no notice would have been taken of the matter by me. The subsequent admission that the correct amount is 18¼ cwt. of 149° acid, brings it into line with ordinary practice.

The fact that Mr. Carr has for a long time been wasting about 5 cwt. of acid for every ton of salt made, lays him open to the charge of failing to profit by the experience of others, who with a simple form of superheater have for many years past accomplished the same result which he now reaches with a complicated and probably expensive form of apparatus.

JOSEPH TYSOE.
East Greenwich, April 15, 1899.

Wooden Water-Pipes.

SIR,—There is a paragraph in this week's "JOURNAL" (p. 933) having reference to some wooden water-pipes taken up near the Marble Arch. Our firm have previously taken up many, and in all parts of the centre of London—I should think some miles. They are always the same—spigoted one into the other—and were laid, I believe, for the water supply of London about 100 years ago. The Secretary of the Company, Mr. W. M. Coe, afterwards became the Secretary of the Grand Junction Water Company—I think about the year 1820.

The wooden pipes used to be cut up some 30 years since, and used as plug-boxes.

I never heard that they were subjected to any process; but, even as found now, they are in a wonderful state of preservation.

JOHN AIRD.
Belvedere Road, Lambeth, April 12, 1899.

SIR,—Many years ago I was superintending the laying of a main in Brick Lane, Spitalfields, and I came across what I thought was a tree. On opening further I found the thickness of the tree ended, and a smaller tree commenced. I had the two pieces cut out and then found that they fitted into each other like turned and bored pipes. The pipes were fairly sound; the boring seemed well done; and they fitted well at the joints. I only took up a few as they left my line, and I continued on, leaving them in the ground, and they are very likely there now.

MAGNUS OHREN.
Forest Hill, April 15, 1899.

SIR,—In the "JOURNAL" this week I see a note on the above. If it will be of interest to your readers, I may say I saw a number of these pipes taken up at Hull, about 50 years ago; and, speaking to my grandfather at the time about them, he said they were made by the pump-makers, who made the old-fashioned ship pumps. The joints were what we now call driving or turned joints—that is, one end was tapered down, so that it could be driven into the other. The socket end had an iron band round it; as I suppose to prevent splitting. The pipes I saw being taken up were then in use, and being replaced by cast-iron pipes.

J. SMITH.
Bangor, April 13, 1899.

The Opposition to the Yeadon and Guiseley Gas Bill.—At a meeting of the Rawdon District Council held last Tuesday—Mr. J. H. Pratt presiding—the Clerk reported that at a meeting of the Joint Councils held on the previous Friday it was decided, with a view to effecting a compromise, that the following terms should be offered to the Yeadon and Guiseley Gas Company: That the maximum price of gas should be 3s. 3d., and the minimum 2s. 9d. per 1000 cubic feet; and that there should be no increase of dividend unless the price was below 2s. 9d., and no decrease of dividend unless the price was above 3s. 3d. The interest was to be 5 per cent. on both kinds of stock. The electric lighting clause was to be withdrawn; the reserve fund was to be 10 per cent. of the paid-up capital; the illuminating power of the gas raised from 14 to 15 candles; and the demand for a testing-station was waived. It was to be asked, however, that every liberty should be given to the Councils to go to the testing apparatus at the works for the purpose of making inspections. The gas for public lighting was to be supplied on the same terms as to the private consumers. A deputation waited upon the Directors of the Company on the night following the meeting, and laid the preceding terms before them. The Directors signified their willingness to accept them, with the exception that if the demand for raising the illuminating power of the gas to 15 candles were insisted upon, the price of gas would have to be 2s. 10d. and 3s. 3d. The deputation thereupon withdrew, having no authority to accept these terms.

PARLIAMENTARY INTELLIGENCE.

Gleanings from the Committee Rooms.

Sir William Coddington's Committee, to whom had been delegated the duty of considering, among a number of London Electric Lighting Bills, the Bill of The Gaslight and Coke Company, reached that measure shortly after noon on Wednesday. Sir William is an experienced hand at Committee work; and, in his conduct of such proceedings, there is one thing above all others which strikes an observer, and that is his open and courteous impartiality. It was this, no doubt, that so strongly commended him to the Matlock Bath authorities, when, after presiding over the Commons Committee who inquired into the Purchase Bill, they selected him to determine the price to be paid to the Company for their property. His award in that case, however, was not productive of great jubilation among the shareholders; but in the case of The Gaslight and Coke Company's Bill, the decision at which he and his colleagues arrived was one which, under all the circumstances, must be considered a triumph for the Company.

When the Bill was called on last Wednesday, a brilliant rank of legal talent faced the Committee; and it looked as though a tough fight was expected. The Company were represented by no less than four learned Counsel, the City Corporation by two, the London County Council by two, and the West Ham Corporation by one. But in the representation by these learned gentlemen things seemed a bit topsy-turvy to one who has become accustomed to associate their names with certain bodies in connection with the Metropolitan Water Supply Commission. There was Mr. Balfour Browne, erstwhile the doughty champion of the London County Council, defending the interests of the Gas Company against their attack; while Mr. Littler and Mr. Pember, who have been appearing for Companies before the Water Commission, and consequently in opposition to the City Corporation and the County Council, were now respectively stoutly assisting those immaculate bodies in their efforts to (as the Vicar of Bray would have put it) "ease" the London gas consumer's "grievance."

The importance of the Bill was not to be measured by its length. Its main object, and the only one to which discussion was directed, was to confer on the Company power to raise £3,500,000 of 3 per cent. debenture stock. It would be idle to try to argue against the prudence, both in the interests of the undertaking and of the consumers, of obtaining possession of capital at such a low rate of interest; and yet the City Corporation, in some incomprehensible manner, saw objection to it. Mr. Pope's speech, in opening the case for the Bill, was interlarded with much ancient history; and the question of the Company's charge for gas was dealt with by him in connection with the petition of the West Ham Corporation, who pointed out the grievance of the gas consumers in those streets of their district in which runs the boundary line of the Commercial and the Gaslight Companies. The price on the one side is only 2s. 6d. per 1000 cubic feet, while on the other it is 3s.—a difference which, while it lasts, will be an ever-present source of chagrin to the 3s. payers, and of trouble to the latter Company. In an incidental way, Mr. Pope referred—though not specifically mentioning the Lea Bridge case—to the serious consequences which would ensue from an alteration of the initial price. With only sufficient capital to carry them on for about twelve months, one hardly dares to contemplate the calamity which would be occasioned by such a decision in connection with this Bill as Lord Camperdown's Committee arrived at in the Lea Bridge case. In this respect, everyone will wish the Bill a safe passage through the Lords. At the conclusion of his opening address, Mr. Pope disappeared, and did not reappear during the remainder of the proceedings.

Before evidence was taken, Mr. Littler and Mr. Pember endeavoured to obtain a postponement of the Bill, in view of the inquiry into the charges of the London Gas Companies by a Select Committee specially appointed by the House for the purpose. They argued that the matters of price and the past administration of the Company so completely governed the opposition to the Bill, that the two inquiries must necessarily run on the same lines, and it was undesirable that there should be any infringement of the duties of the other Committee. Plausible though the argument was, Sir William Coddington and his colleagues took the sensible view that the Bill having passed the preliminaries in the House, and having been referred to the Committee, it was their duty to proceed with it.

The examination of Mr. J. W. Field, the General Manager of the Company, was undertaken by Mr. Balfour Browne. Witness again gave proof of his adroitness in dealing with figures, and on more than one occasion in his cross-examination he showed himself to be an equal adept at repartee. References to millions of pounds and thousands of millions of cubic feet of gas fell off his tongue as glibly as though they were common numbers; but, sifted out, his figures all amounted to this that, after the Company had met their indebtedness at their bankers, they had unexhausted capital powers amounting to £310,000. Of this balance, he computed that £250,000 will be required during the present year, and that the Company will then only have £60,000 in hand. This proved that the obtaining of further capital powers was a matter of urgency. Then he estimated that the £3,500,000 for which they were now asking would carry them on for about ten or twelve years. Witness also laboured hard to show where and how the differences arose between the prices charged by his Company and the two other London Companies; and the comparative figures which he furnished supplied the opposition Counsel with a good deal of material on which to cross-examine him. His examination occupied nearly two hours on Wednesday afternoon; and the opposition kept him briskly engaged for a corresponding time the following morning. It was suggested by Mr. Littler that the Company were hurrying the Bill through this session in order that they might obtain extended capital powers before the Committee who were to inquire into the price of gas had an opportunity of reporting; and he inquired why the Company did not ask for further capital when they were before Parliament last session with the Bill for the consolidation of their capital. Mr. Field gave two reasons: First, that it was not wise for a Company to come to Parliament for new capital until they were obliged to do so; and, secondly, before his Company came to Parliament for new capital, they wanted to put their capital on an intelligible basis. Upon which Mr. Littler, with a callousness which must have shocked the Governor of the Company (who was an attentive listener through Thursday and Friday), remarked: Some people delay coming to Parliament as long as possible if they have bad consciences. Whew!

The engineering evidence was tendered by the three heads of the departments—Mr. G. C. Trewby, the Company's Consulting and Constructing Engineer, Mr. G. F. L. Foulger, the Distributing Engineer, and Mr. T. Wilton, the Superintendent of the Chemical Works. This division of evidence caused some little confusion and inconvenience to the cross-examining Counsel in more ways than one. For instance, to some of the questions put to him, Mr. Trewby had to refer Mr. Littler to the witness who was to follow him. Then, again, Mr. Trewby had based his calculations for the future on the averages of the last twenty years, while Mr. Foulger and Mr. Wilton had worked theirs out on the averages of the past ten years. It would assuredly have been better for the whole of the figures (worked out on one basis) to have been in the hands of the first engineering witness, and then to have called the others to corroborate those referring to their own particular departments. The Company also thought it unnecessary to produce evidence from outside their own circle to endorse the figures of the Engineers. "Chartered" officials, like other people, are not infallible; and it would have been at any rate an act of courtesy to the Committee, and a support to themselves, to have called an independent expert who had verified the calculations. But, of course, it is very easy, if figures are afterwards questioned, to shelter behind that expansive term "estimates."

The case for the Bill ended on Thursday; and the next day, Mr. Littler, Mr. Pember, and Mr. Morten addressed the Committee. Counsel recognized that the Company would require more capital in the near future; and Mr. Pember asked that they might only be allowed a few hundred thousands of pounds to carry them on until it was seen what was the outcome of the inquiry into the charges for gas. It was argued that it would not be wise, in view of the discontent in the Company's area of supply, to grant the Company money sufficient to enable them to stay away from Parliament for several years—20 to 21 years, according to Mr. Pember's calculation, at the present rate of progress. No witnesses were called by the opponents; but Mr. Charles Hunt, who had been consulted, afforded valuable assistance to Counsel, and was prepared, if necessary, to give evidence.

After deliberating in private, the Committee declared the preamble of the Bill proved, but reduced the amount of capital to £2,500,000, which, taking the Company's own estimate for the larger amount, will meet their requirements, and render it unnecessary for them to submit themselves to Parliament again, during (say) the next nine years—that is, assuming they are successful in piloting the Bill safely through the Upper House.

The Select Committee who have been appointed to inquire into the charges of the Metropolitan Gas Companies are to commence their work this week. We understand that the parties concerned are not to be represented by Counsel.

HOUSE OF COMMONS.

Monday, April 10.

METROPOLITAN WATER COMPANIES [GOVERNMENT] BILL.

On the House going into Committee on this Bill,

Mr. Lough appealed to the President of the Local Government Board not to press the Bill, as the honourable member who represented the views and wishes of the London County Council was unable, through illness, to be present.

Mr. Chaplin expressed regret at this circumstance, but said that he was afraid if legislation were postponed whenever members interested were unfortunately laid up, there would be no progress with business. The views of the London County Council were powerfully presented before the Select Committee, and the Council came to the conclusion that, having thus made their wishes known, they would reserve any further representations they might have to make for the passage of the Bill through the other House.

Clause 1, dealing with the duties and powers of the Metropolitan Water Companies in connection with supplying each other with water, was agreed to.

On clause 2, relating to the issue of debenture stock to provide funds for the construction of the works necessary to give effect to the requirements of the Act,

Mr. Pickersgill moved an amendment which he said he had been unable to put on the paper. The clause would enable any Metropolitan Water Company, with the consent of the Local Government Board, to raise money required for the purposes of the Act; and this he contended was an absolute departure from ordinary parliamentary practice. No Water Company had hitherto been allowed to raise money without the amount having been specifically approved by the House. If the amendment would in any way stand in the way of protection to the people of East London from water famine, he would be the last man to move it; but in this, a financial detail, there was no urgency to justify departure from long established and salutary practice. His amendment would not leave the Companies without resources from which necessary expenses could be defrayed; and it provided that they might apply to the purposes of the Act any money which they had authority to raise under any other Act. The majority of the Companies had an ample margin of funds available; and those who had not had Money Bills before the House this session in which any additional amount required for the purposes of the Act might very well be inserted. He therefore moved a preliminary amendment to leave out the words "raise any money required to be contributed by the Company."

Mr. Chaplin said the honourable member was inaccurate in stating that there had been no opportunity of giving notice of his amendment, because intimation that the Bill would be taken on the present occasion was given on the 28th of last month. It was true that in Water Bills there had always been a clause providing for a sinking fund; and that the plea of urgency on the general progress of the Bill did not apply. There were good reasons why a sinking-fund clause should not be included in the measure. The whole question was thrashed out by a Royal Commission, who recommended that in this particular case the provisions

as to sinking fund should not apply, because the works contemplated under the Bill were to be carried out, not on the initiative or will of the Companies, but on the initiative and under the orders of the Local Government Board. It was held by the Commission that these were works which, to use their own words, "would not yield revenue or profit for the Companies." Under these circumstances, it would be harsh to insist on a clause requiring a sinking fund. It was important that the Bill should become law; and he thought he had given adequate reasons for asking the Committee to resist the amendment.

The amendment was negatived; and, the remaining clauses having been agreed to, the Bill was reported without amendment.

Mr. CHAPLIN then asked that the Bill might be read the third time; but, several members on the Opposition benches objecting, the matter was not pressed.

The following further progress has been made with Bills since the re-assembling of the House on Monday last week, after the Easter recess:—

Bill read a second time and committed: Rushden and Higham Ferrers District Gas Bill.

Bills reported: Gaslight and Coke Company Bill (with amendments), Metropolitan Water Companies [Government] Bill (without amendment).

Bills read the third time and passed: Horsforth Urban District Council Water Bill, Nottingham Corporation Bill, Nuneaton and Chilvers Coton Urban District Council Water Bill, Rhondda Urban District Council Bill, Stockport Corporation Water Bill, Wetherby District Water Bill.

The Brigg Urban District Gas Bill, the Scunthorpe Urban District Gas and Water Bill, the Shirebrook and District Gas Bill, the Derby Corporation Water Bill, the Leicester Corporation Water Bill, and the Sheffield Corporation (Derwent Valley) Water Bill, and the Menstone Water Bill, have been referred to a Select Committee, consisting of Sir John Brunner, Chairman, Sir George Fardell, Mr. W. Jones, and Mr. Cubitt; to meet on Tuesday, April 18.

Petitions have been presented against the following Bills: Airdrie and Coatbridge Water Bill, Bristol Gas Bill, Lanarkshire (Middle Ward District) Water Bill, Lea Bridge District Gas Bill, London Water (Purchase) Bill, Yeadon and Guiseley Gas Bill.

REFEREES' COURT, HOUSE OF COMMONS.

Tuesday, April 11.

The Fight for the Derwent Watershed.

The Court of Referees—the Chairman of Ways and Means (the Right Hon. J. W. Lowther) presiding—had under consideration to-day the petition presented by the Corporation of Rotherham against the Bill promoted by the Leicester Corporation to enable them to obtain a supply of water from the River Derwent The *locus standi* of the petitioners was questioned.

Mr. WEDDERBURN, Q.C., appeared in support of the petition; Mr. BALFOUR BROWNE, Q.C., represented the promoters of the Bill.

Mr. WEDDERBURN said this was a claim by the Corporation of Rotherham to be allowed *locus standi* in opposition to the Leicester Corporation Water Bill. There were three competing Bills coming before a Committee of the House—those of the Leicester Corporation, the Derby Corporation, and the Sheffield Corporation. All these Corporations were seeking the same watershed—the Peak, of Derbyshire—and also power to take the head waters of the River Derwent. Sheffield and Rotherham were close to the watershed; Derby was farther away; and Leicester was distant some 60 miles. The petition which the Rotherham Corporation had prepared alleged that the Bill would injuriously affect them. They derived a large supply of water from Sheffield under agreement, but were in urgent need of a further supply; and the Sheffield Bill was promoted partly in consequence of Rotherham's requirements. For all practical purposes, Rotherham would be jointly interested in the water supply proposed to be obtained by the Sheffield Bill, under which it was proposed to authorize water-works in the same valley and watershed as the works proposed by the Leicester Bill. There was no such urgent necessity for Leicester to obtain further water as there was for Rotherham.

Mr. GREENE inquired if there were any clauses in the Bill relating to the lighting or water supply of Rotherham—the only two things mentioned in the Standing Order referred to—134A.

Mr. BALFOUR BROWNE replied that there were none.

Mr. GREENE: Then how does it come within 134A?

Mr. WEDDERBURN: The Bill does relate to the water supply in this sense, that Rotherham is seeking to get water from this very watershed.

Mr. BALFOUR BROWNE: No; Sheffield is.

Mr. WEDDERBURN: Rotherham is going to get it *vid* Sheffield.

Mr. CHANDOS LEIGH: Mr. Wedderburn argues that because they have entered into an arrangement with Sheffield for the supply of water, Rotherham is, to all intents and purposes, to be treated as Sheffield.

Mr. WEDDERBURN said that was his contention.

After further argument, the Chairman said the Court could not accept the construction that Mr. Wedderburn wished to put upon the Standing Order.

Mr. WEDDERBURN said in that case he would rely on Standing Order 134, and ask the Court, in the exercise of their discretion, to give him *locus standi*. In reply to the Court he acknowledged that sheffield was promoting a competing Bill, and that Rotherham would be before the Committee to some extent, through Sheffield; but he submitted that it would be better and more convenient if Rotherham were directly before the Committee. Both Sheffield and Rotherham must eventually come to the watershed in question. The Derby Corporation did not object to Rotherham appearing in opposition to their Bill; so that, if the present claim were disallowed, their position would be rather anomalous, as Rotherham would appear against the Derby Bill, and not against that promoted by Leicester, though the two schemes were competing, and related to the same watershed.

Mr. BALFOUR BROWNE having replied, the *locus standi* of the petitioners was disallowed.

HOUSE OF COMMONS COMMITTEE.

Wednesday, April 12.

(*Before Sir* WILLIAM CODDINGTON, *Chairman, Mr.* MYERS, *Mr.* J. SAMUEL, *and Mr.* COLVILLE.)

THE GASLIGHT AND COKE COMPANY BILL.

This Bill, which is to empower The Gaslight and Coke Company to raise, by the issue of 3 per cent. debenture stock, a sum of £3,500,000, and also to purchase and hold certain lands, came before the above-named Committee to-day.

Mr. POPE, Q.C., Mr. BALFOUR BROWNE, Q.C., Mr. CLAUDE BAGGALLAY, Q.C., and Mr. DANCKWERTS appeared for the promoters. The opponents of the Bill were the Corporation of West Ham, represented by Mr. E. MORTEN; the London County Council, by Mr. PEMBER, Q.C., and Mr. J. G. TALBOT; and the Corporation of London, for whom Mr. LITTLER, Q.C., and Mr. H. A. RIGG appeared.

Mr. POPE, in addressing the Committee for the promoters, remarked that if it were not for questions raised by one or other of the petitioners, he should say that the matter was as simple a one as could have come before them. The object of the Bill was to authorize the issue of fresh capital, and to legalize the acquisition of fresh lands which hitherto had been held by Trustees for the purpose of the Company. This was the whole proposition of the Bill; and one could not help feeling that it was a simple matter, unless there were questions arising in the course of discussion which might result in complications. The proposition of the Company was to raise £3,500,000 of additional capital. The Company, of course, would be bound, and would endeavour to satisfy the Committee, that this amount would be enough, under their ordinary rate of progress, to keep them in comfortable circumstances for about twelve years. The £3,500,000 they anticipated would be expended in this time in the extension of the works and of the undertaking. Their idea was to raise the money on terms most advantageous to the consumers, because they proposed to raise it as debenture stock at 3 per cent., and to dispose of the stock under the auction clauses, which were familiar to the Committee—applying, of course, any premium which might be derived from the sale to capital, but not bearing any interest or dividend. He ought to point out to the Committee that as the Bill was originally conceived, it was proposed that the debenture stock should rank *pari passu* with their existing 3 per cent. debenture stock; but the authorities of the House of Lords saw objection to this. Therefore, in clause 6 of the Bill, this provision had been amended, and the Company proposed that the 3 per cent. debenture stock should rank next after the existing 3 per cent. debenture stock; and the preamble of the Bill would require amendment so as to make it consistent with clause 6 as it now stood. The Gaslight and Coke Company had had no fresh authority from Parliament for the raising of capital since 1876; and he would recall to the minds of the Committee the position of the Company and of the other Gas Companies in that year, when their capital was authorized. In 1875, a Committee, which was presided over by the late Mr. Forster, sat upon the general question of the price of gas, and the terms on which capital should be granted to the various Gas Companies, who were seeking it. It was in this year that Mr. Forster's Committee reported in favour of the scheme which they now knew as the sliding-scale and as the auction clauses; and from that date all the provisions of the sliding-scale and of the auction clauses had been inserted, not in a General Act, but in each Special Act as it had come before Parliament. The Company's Act of 1876, therefore, being subject to the recommendation of Mr. Forster's Committee, contained these provisions; and their capital since that date had been raised in conformity with the power given. The Company then took power to raise £2,000,000—a certain amount of it by ordinary stock, and a certain amount to be borrowed money. This had been raised to within a fraction of the actual existing powers given. What the fraction might be, the Committee would hear accurately from the witnesses. He would remind the Committee what the nature of the legislation to which he had referred had been. It had previously been the practice, not only of the Gas Companies, but of other Companies, in the issue of new stock to allot it to their existing proprietary on certain terms; leaving the proprietary, if they could, to realize a premium on it, and put that premium into their own pockets. This was a considerable benefit to the shareholders at that period. The auction clauses, however, provided that in future, due notice having been given to the Metropolitan Board of Works (who were then the authority) and the City of London, as representing the consumers, all capital, instead of being allotted among the shareholders, was to be submitted to public competition by auction, with the idea that the market should give the premium, and that this premium should go in relief of the consumer, rather than for the benefit of the individual shareholder as a speculation on the stock. The result was that now all capital was submitted to competition by public auction. If it fetched a premium on the nominal price of the stock, this premium was taken into the capital of the Company for the purposes of the Company, but was not dividend-bearing capital. It was a gain to the consumer. The sliding-scale had a different object in view. Having explained the sliding-scale, the learned Counsel said that this scheme was acquiesced in very early by some of the Companies. Mr. George Livesey, for instance, had given evidence in support of it. It was a scheme to make the consumer a partner in the economical and profitable management of the undertaking. The reductions in the price of gas which had followed the adoption of the scheme had not only been of advantage to the Company, by enabling them to increase their dividends on their nominal capital, but also to the consumers—the remainder of the profit going to them. Out of the extra profits made in this way by increased efficiency of management, or the cheapening of production, about five-sixths went to the consumers and about one-sixth into the pockets of the shareholders of the Company. Since that date, of course, this scheme had been the general parliamentary system on which gas capital had been authorized to be raised. All the capital they had raised since 1876 had been on the faith of the maintenance of the conditions put upon them in that year. He might say that, not only was this advantage purchased by the Companies by giving a larger portion of interest to the consumer, but they had certain claims to back-dividends and other rights which would have innured to their benefit if they had retained their statutory powers as to dividend, but which they

gave up in order to adopt the new system. Since 1876, the municipal acquisition of gas-works (which up to that time had been a matter of recognized parliamentary principle) had not been so frequent or so much encouraged by Parliament as it was formerly—simply because the area of gas supply was very rarely co-ordinate with the area of municipal boroughs; the interests of gas consumers not being the interests of the ratepayers of the borough. It might be to the interest of the ratepayer to acquire a particular undertaking; but such acquisition might not be to the interest of the general consumer. He remembered in the case of the Oldham Corporation, which came before a Committee presided over by the Duke of Richmond, an endeavour was made to acquire the undertaking of the Gas Company. It was sought to obtain for the gas consumer outside the district of the Corporation the same privilege which the sliding-scale would have given to him if the undertaking had belonged to a Company. The difficulty of doing this, however, became immense, because in the case of corporations they did not get dividends at all. They could not apply the sliding-scale to a corporation; as they could not give the outside consumer the same security as against a company. There might have been acquisitions of gas-works by corporations; but the cases had not been so frequent, nor so much a matter of course, as they had been before 1876. Those of them who were interested in water companies, had felt that the difficulty was that they could not use the same arguments as to water, because in that case there was no sliding-scale provided. The general tendency towards the acquisition of water undertakings by corporations was, therefore, very much stronger than the case for the acquisition of gas undertakings, because they could not, in the case of a corporation, protect the consumer, who might not be a ratepayer—they could not protect him so well in the case of a municipality as with a company. With regard to the petitions against the Bill, he would deal first with that of the Corporation of the City of London. The petitioners stated that they were supplied with gas by the Company, and that the ratepayers would be injuriously affected by the Bill. This, he contended, and the whole language of the petition, was beside the question of the necessity for the extension of their works. He should have thought that the consumers in the City of London, as elsewhere, would not be injuriously affected by a Bill the object and purpose of which was to enable the Company the better to perform their statutory duty towards them. The Company were bound to supply them with gas; they could not do so without extending their works; and they could not further extend without more capital. Therefore, if the terms on which the capital was to be raised were fair and reasonable, it must be to the interests of the consumer that it should be raised, in order that the duty of the Company to the consumer might be more efficiently and regularly performed. The Committee would require him to show them why the Company wanted this money, how they proposed to spend it, and the time during which it would last, so that they might not become too independent of parliamentary control in the future. He would do this by evidence. The petitioners said that the proposal of the Bill would increase the price which would have to be paid for the Company's undertaking in the event of its being purchased at some future time by the Local Authorities. But why? It was proposed to raise the capital under the most favourable conditions. It was because of this plea on the part of the petitioners that he had made reference just now to parliamentary sanction in regard to the purchase of gas undertakings. This sanction did not exist to the same extent, and in the same way, as there was a parliamentary tendency to encourage the acquisition by municipalities of water undertakings. The petitioners said that in 1868 power had been given to them to purchase the gas undertakings. This power, no doubt, was given; but from that date no application had ever been made on the part of the petitioners for such purchase.

Mr. Baggallay: The power has lapsed. They only had it for three years.

Mr. Pope: I did not know that.

The Chairman: Is it admitted that the power has lapsed?

Mr. Pope: It is agreed on all hands that it has lapsed.

The Chairman: The impression given by the petition is that it has not lapsed.

Mr. Littler: It was not intended to convey that impression.

Mr. Pope said that the petitioners went on to imply that in 1876 what was done was done with a view of preventing undue enhancement or inflation of the price of the undertaking in the event of purchase. This was altogether an inaccurate statement. What was done in 1876 was purely in the interest of the consumer. It was thought that those representing the consumers should, in their interest, be served with a notice before any further attempt was made by the Company to raise capital. The petitioners went on to say that, following the precedent of large Municipalities in the kingdom, the City of London might require to purchase the undertaking of the Company within their area. If they believed this, nobody else did. What might become of the Water Companies, he could not say; but nobody believed that the Gas Companies would be acquired by the Local Authorities. Then the petitioners said they objected to the proposal to raise the whole of the new capital by borrowing, and submitted that the proportion of borrowed money to mere capital laid down in the Act of 1876 should be maintained, and that the whole of the capital should be raised subject to the notices in that Act provided. He must say he failed to understand this. Why should the petitioners want the Company to raise their capital on the most expensive terms? He was unable to understand what the finance of the Corporation amounted to, when they said the Company should raise the money in shares which might bear 12 per cent., rather than in debentures on which they would have to pay only 3 per cent.; the market value being ascertained in the same way—namely, by the auction clauses. At the instance of the Corporation and the London County Council, in the case of the Water Companies, the action of Parliament lately had been to refuse to allow them to raise money by shares, and to compel them to issue debenture stock. The more he saw of the interference of the London County Council and the Corporation of London in these money matters, the less he thought of the financial intelligence which they brought to bear upon the consideration of the subject. The petitioners went on to say that, if the Bill passed, clauses should be inserted to carry out, as far as possible, the objects of the Act of 1876, especially as to enabling the petitioners to examine accounts. Again, he did not know what was meant. The Company were anxious to carry out all their obligations; and surely it might be left to the Committee to see that the policy of protecting the consumer was continued. Then again, it was said that clauses should be inserted in the Bill to prevent the Company from deriving any enhanced value from the works now proposed. This was a most iniquitous proposal. The provision against enhanced value had been considered in connection with water undertakings; but purchase in that case had been imminent. It was perfectly monstrous to say that it should be considered in the case of gas undertakings. This showed the spirit in which public bodies had come to regard such important undertakings as these. As to the question of accounts, it was not proposed to repeal the Act of 1876; and they did not desire to evade it. Under that Act, elaborate provision was made for audit. An Auditor was to be appointed who was to be removable by the Board of Trade; and the Local Authorities were to be entitled to be heard, and to interfere. If they thought themselves aggrieved, they might appeal to an arbitrator to have the grievance redressed. Paragraph 10 of the petition set forth: "Towards the close of last session, a Select Committee was appointed by your honourable House 'to inquire into the powers of charge conferred by Parliament on the Metropolitan Gas Companies, and to report as to the method in which those powers have been exercised having regard to the difference of price charged by the various Companies.' Owing to the late period of the session at which they were appointed, the Select Committee were unable to proceed with their inquiry, but reported to the House on the 4th of August last recommending that a Committee on the same subject should be re-appointed in the present session. Notice of motion for such re-appointment has already been given, and your petitioners believe that such Committee will be again appointed; and they submit that, pending the appointment and report of that Committee, it is undesirable in the public interest that the Bill should be proceeded with." The Committee, however, had nothing to do with the necessity for the provision of capital to enable the Company to carry out their statutory obligations. If any further regulations were to be introduced as to the price of gas, they would not affect the question that the Company required further capital to extend their works, in order to supply more gas—whatever the price might be which Parliament thought should be charged for it. Clause 11 said: "Your petitioners are large consumers of gas supplied by the Company, and pay annually therefor a very considerable sum. The Company are now charging the sum of 3s. per 1000 feet of gas, which amount is excessive, and more than is charged by other Companies under similar circumstances." It was true the Company were charging 3s., and it was equally true that the price had been recently enhanced; but the Company themselves were the sufferers, because it limited the amount of dividend they were able to pay. The last increase in price made by the promoters was from 2s. 10d. to 3s. per 1000 cubic feet; and this was in consequence of finding that their reserve fund was almost exhausted by the demand made on them for increased expenditure. This had involved a diminution of dividend of ½ per cent. They had raised their price, and the shareholders had suffered through the operation of the sliding-scale. If they raised the price of gas, they must reduce their dividend so as to make the shareholders participate in the inconvenience which arose. The 12th paragraph said: "Your petitioners submit that the payment of 3 per cent. interest upon the capital proposed to be raised under the Bill will induce the Company to further increase the price of their gas, and inflict an unnecessary hardship upon your petitioners and those whom they represent; and they submit that if the Bill pass clauses should be inserted to prevent and restrict such an increase as aforesaid." He had not the most remote notion what this meant. In the next paragraph they said: "Your petitioners do not believe that any satisfactory reasons exist for so high a charge for gas as that made by the Company; and they submit that in the event of your honourable House seeing fit to proceed with the Bill, no further powers should be conferred upon the Company unless and until such charge is reduced." That was to say that the Committee were to take in hand an inquiry as to what the Company ought to charge, and to adopt some legislation to make that the fixed rule—altogether ignoring the legislation of 1876, and its marked success. Then they said: "Your petitioners object to the Company being authorized to purchase 150 acres of land not be used for manufacturing gas, as being unnecessary, and submit that if so large a quantity of land be necessary for the conduct of their undertaking, then that the locality or district within which such land may be purchased, and the object for which it is to be used, should be defined in the Bill." This was as to a detail in the Bill which would be argued at the proper time. The remainder of the petition consisted of general allegations. Coming to the petition of the London County Council, it was on the same lines as that of the Corporation, but was rather more extended. The first paragraph of importance was No. 6, which said: "The Company introduced in the last session of Parliament a Bill having for its object the conversion of the then existing capital of the Company into new stock, increasing the nominal amount of the stock and reducing in a corresponding measure the dividend payable on the stock." Then there were five other paragraphs, which gave an account of the legislation of last session which the County Council had unsuccessfully opposed; the Company's Bill passing through both Houses of Parliament. The petitioners seemed anxious to complain of what Parliament had done. The Company had came to Parliament for a single financial arrangement—to establish a consolidated stock bearing 4 per cent., instead of one bearing 10 per cent., to be distributed among the then existing stockholders in exact proportion to their holding. It was a principle which Parliament had already sanctioned. Having referred to the lower charge in the South Metropolitan district to that of The Gaslight and Coke Company, they said in paragraph 10: "This inequality of charge has always been considered unfair to the northern districts of London; and this unfairness has come recently into greater prominence in consequence of the rise which The Gaslight and Coke Company have made in their charge for gas." What this meant was that the initial or standard price in the one district was greater than in the other, though Parliament had deliberately fixed it. When the charge in the one case was 2s. 10d. per 1000 cubic feet, and in the other 2s. 3d., the promoters had had to raise their price to 3s., which made the disparity greater; but the South Metropolitan Company were able to divide a larger amount in the form of dividend as a result of keeping down the price. With regard to allegations in the petition that the Company had still power to issue enough capital to meet their requirements for at least two years, evidence would be given to show that this was not the case. In paragraph 16 it was said: "Your petitioners humbly submit that the

whole circumstances relating to the charges made for the supply of gas in London by this Company, as compared with the other Metropolitan Gas Companies, require consideration; and they submit that the powers and concessions now sought by the Company should not be granted, or that if granted they should be accompanied by such an alteration in the powers of the Company, or by such provisions, as would have the effect of causing an adequate reduction to be made in the price charged by them for gas on the north side of the River Thames." It was not alleged that it was desirable that the circumstances of the supply of gas by all the Metropolitan Companies should be inquired into; but the demand was limited to this particular Company, as compared with other Companies. It was, however, manifestly impossible that this question could be gone into largely in the course of a week or two's sittings. The other Committee who had been appointed would inquire into the whole question, and not into the action of any particular Company who might be before Parliament at the moment. He would not go at any length into the West Ham petition, because it was covered by the other petitions; but he would say that for Parliament to interfere with the arrangement of 1876 would be a very serious step, as all the capital since then had been raised on the faith of the standard price then settled. Generally he thought he was right in saying that Parliament had exhibited a great reluctance even to discuss this settlement. If it were interfered with, the Company would be unable to raise their money at 3 per cent.

Mr. Littler said he should like to place before the Committee a difficulty presented by the Bill. As they were aware, the Committee appointed last year to inquire into the general question of the price of gas had been re-appointed this session, and were about to commence work. Price was the *crux* of all disputes on Bills of this kind before Parliament; and Mr. Pope himself had said that the time to discuss the question of price was when a Company came for powers to raise fresh capital. If now they were to discuss this, they would have to go into the details of management, which would almost seem to trench on the labours entrusted to the other Committee; and, on the same issue, different conclusions might be arrived at. The Company had come to Parliament, knowing the general question was to be gone into, and were endeavouring to obtain £3,500,000 of fresh capital before the General Committee could report. He protested against this; and he thought it would be a great expenditure of labour to no advantage if this inquiry were to go on *pari passu* with that of the other Committee.

Mr. Pember concurred in the remarks of Mr. Littler, and said that the Company were endeavouring to take time by the forelock, and obtain this fresh capital so that they would not have to come to Parliament again for twelve, fifteen, or perhaps more years, and would therefore be able to snap their fingers at any recommendation of Sir James Rankin's Committee.

The Chairman, after the Committee had deliberated, said: This Bill has passed its preliminary stages in the Commons, and has come before the Committee in the usual way; and we see no reason why it should not be proceeded with.

Mr. J. W. Field, *examined by Mr.* Balfour Browne,

gave a detailed account of the history of the Company, and of its amalgamation with various other Companies. The aggregate of the capitals of the various Companies amalgamated gave a total of £11,743,000; and this became the capital of The Gaslight and Coke Company, as it existed up to last year. Of this, £9,204,000 was share capital; the remainder (£2,539,000) being borrowed. Under the conversion scheme of last year, the share capital had become £21,642,992 10s., and the debenture stock £4,193,975. Up to Jan. 1 last, the Company had still power to raise some £840,000 of capital; but at the present moment there remained but £310,000 of unraised capital, and it was calculated that of this sum about £250,000 would be expended by the end of the year. This would leave a balance of only £60,000; so that if the Company were to continue to discharge their duties to the public, they must obtain further capital powers before next year. Up to 1875, the Company had expended on works, mains, and so forth, a total amount of £8,149,319, which gave a capital expenditure of 16s. 4d. per 1000 cubic feet of gas sold at that date, or £816 per million. Between that date and 1898, a further sum of £4,533,615 had been spent; and the total amount expended up to Dec. 31 was £12,682,754, which worked out at 12s. 1d. per 1000 cubic feet, or £604 per million. He had taken the corresponding figures for the South Metropolitan Company. Their capital expenditure per 1000 cubic feet had been reduced during the same period from 13s. 1d. to 8s. 7d. per 1000 cubic feet, or from £656 to £428 per million. Of the capital now asked for, £2,500,000 would be spent upon works and lands, £208,000 upon mains, £416,000 upon automatic meters, £140,000 upon ordinary meters, £230,000 upon stoves—a profitable trade, because it tended to equalize the consumption during the 24 hours,—and £75,000 on products works. The total amounted to about £1,000,000 less than had been expended since 1875, as it was estimated that the expenditure in future years would not be so great. Since 1875, the increase in the manufacturing capacity of the Company's works had been 65 million cubic feet; the holder capacity had been increased by 51 million cubic feet; and the sale per day had been more than doubled. The Gaslight and Coke Company were the only Company who had taken their works out of London; nearly the whole of their gas being made at Beckton. The South Metropolitan Company had to find interest upon a smaller capital sum per 1000 cubic feet than The Gaslight and Coke Company, who paid a charge of 1s. ¾d. per 1000 cubic feet; the corresponding figure for the South Metropolitan Company being 9·18 per cent. The sale of gas in 1898 by his Company amounted to 21,000 million cubic feet. No other London Gas Company had suffered as much as The Gaslight and Coke Company from the advance made in recent years by the electric light. They supplied the busiest part of London; and besides this some of their best customers had been clubs, theatres, restaurants, and so forth, and nearly all these now used the electric light. He calculated that if it had not been for this competition, instead of selling 21,000 million cubic feet of gas per annum, as they did at the present moment, they would be selling 25,000 millions. All the Gas Companies had experienced an unusually small increase in sale of recent years, owing to the weather not having been propitious for them; and his Company felt this, perhaps, more than any other. There had been an absence of fogs, and very little dark weather, in the winter; and as they supplied a business section, they felt this very much.

Mr. Balfour Browne: You are still obliged to have your plant ready for an emergency which does not come?

Witness: Yes; and that means that we have to keep the capital in our works. All the people who use the electric light still continue to be our customers—that is to say, they retain their gas-fittings, and so forth, so that in the event of the electric plant breaking down they can come on us to supply them with light to any extent; and we have to keep prepared for the emergency.

In reply to further questions, witness said the difference in the standard price between the South Metropolitan Company and his Company had been sanctioned by Parliament years ago; and the circumstances which warranted this difference when it was sanctioned still existed.

The Chairman: What is it makes the greatest difference in the consumption of gas—fogs or extreme cold weather?

Witness: Extreme cold weather, now that gas-stoves and fires are so largely used.

Examination continued: Coal cost his Company more than it did the South Metropolitan Company, for the reason that they had to carry it by lighter to their works on the Regent's Canal. This extra cost was 2s. 6d. per ton, which amounted to just under 1d. per 1000 cubic feet. Then his Company used a larger amount of enriching material than the South Metropolitan Company, for the reason that the Referees had provided more testing-stations in connection with their undertaking than in the case of the South Metropolitan Company, and these stations in many cases were farther away from the works. The Gaslight and Coke Company had fifteen testing-stations, some of which were 10½ miles from the works; whereas the South Metropolitan Company had six stations, the farthest being 4½ miles from the works. When gas was tested a long way from the works, it was bound to be enriched, for the reason that it lost quality by passing a long distance through pipes. His Company made no charge for meter-rent, as the South Metropolitan Company did; and they received less for coke than the South Metropolitan Company, for the reason that at their works at Beckton they had no ready land sale. Their working expenses were heavier than those of the South Metropolitan Company. They used fewer mechanical stokers. Their capital expenditure had been so great that they had hesitated to embark on the increase which would have been necessary if a large number of these stokers had been obtained. His Company received less by ½d. for stove-rentals; and on wear and tear there was a difference against them of over 2d. The increase in the number of consumers since 1883 had been in the case of his Company 69 per cent., the South Metropolitan Company 81 per cent., and the Commercial Company 42 per cent. Under the sliding-scale arrangement, he estimated that his Company's consumers had been saved £14,312,000 since 1876, with an additional £240,000 through the taking off of the meter-rent. The saving in the case of the South Metropolitan Company had been £4,500,000. For every £1 the consumer secured under this arrangement, his Company obtained 3s. 6d., while the South Metropolitan Company received 5s. 4d.

Thursday, April 13.

The examination of witness was continued by Mr. Baggallay this morning. Dealing with the petition of the Corporation of London against the Bill, witness said they had complained that the proposed new expenditure would operate to their disadvantage in the event of their purchasing the undertaking at some future time. In reply to this, he had to say that he had never heard of a company being purchased on the basis of capital expenditure; it had always been on the basis of the divisible and maintainable profits. The proposal of the Company was to raise their new capital at the lowest possible rate of interest. As to the value of the Company's debentures, a short time ago they had sold £150,000 worth of 3 per cent. debentures stock; and, after deducting expenses, they received no premium at all. The stock, in fact, was sold for a few pounds under par. As to the allegation that the price charged for gas by his Company was excessive, it was necessary, before arriving at a conclusion on the subject, to take into consideration all the circumstances of the case. As had been pointed out already, the conditions under which his Company worked were conditions imposing very great expense on them. The South Metropolitan could manufacture much more cheaply than they could. The Corporation suggested in their petition that the locality in which the promoters were to purchase their additional lands should be specified in the Bill; but this would be very undesirable indeed. They would be cornered at once—the market would be put up against them. They had had some experience of the inconvenience of this, not very long ago. They had negotiated for the purchase of some land for which £14,000 was asked. They considered this too high a figure, and had refused to give it; and ultimately, negotiating through a third person, they had obtained the land for £8000. As to the opposition of the London County Council, witness pointed out that when the settlement of 1876 was brought about, the predecessors of the Council—the Metropolitan Board of Works—and the Corporation petitioned against any alteration in the Bill, so that they were satisfied with the settlement. In 1876, there was a difference of something like 9d. per 1000 cubic feet in the price of the two Companies; and this was taken into account in fixing the initial or standard price. This was the settlement against any alteration of which the Metropolitan Board of Works petitioned. Referring to West Ham, witness said that, while the gross gas-rental of the whole undertaking of the Company was about £3,000,000, the gross amount received from the borough of West Ham was £43,000. The Company paid £18,000 to the district in rates. The net amount taken by the Company out of the district was thus about £25,000 out of their £3,000,000.

Mr. Baggallay: The total amount you propose to raise is £3,500,000?

Witness: Yes.

I believe the amount authorized by the Act of 1876 was £2,000,000?—Yes; but at that time we had not completed our amalgamations. Our output was then 10,000 million cubic feet a year; it is now 21,000 millions. The amount of capital we were authorized to raise, with the premium attaching to the stock, was practically £3,500,000, when our output was 10,000 million cubic feet; and we only ask for the same sum now that the output has more than doubled.

Mr. Littler, in cross-examination: Why did you not ask for more capital when you came to Parliament last year with a Bill for the re-arrangement of your finances?

Witness: In the first place, it is not desirable to come to Parliament when you are not obliged to; and, in the second place, before raising more money we thought it would be advisable to put our whole capital account on an intelligible basis.

Is it the ordinary practice for a Company to wait before asking for more capital until they can put pressure on Parliament?—No; I do not say that.

You represented to the Committee that you would be absolutely helpless—and penniless, so to speak—if you did not get the powers you are asking for this year?—The boot is on the other foot. Parliament under these circumstances can put pressure on us.

You say, "Whatever happens we must have money"?—Yes.

Is it a usual course for a Company to wait until they have no sort of margin whatever to work with, before coming to Parliament for fresh capital—more especially when the Company were before Parliament last year?—It is a common thing to wait till you are obliged to come to Parliament.

Some people who have bad consciences do that I know. Was it not one of your reasons that Parliament would not give you your re-arrangement of capital last year if they had thought that you wanted more money?—No. We did not want to complicate the Bill of last year by asking for more capital.

Do you suggest that the members of a Committee would not have been able to deal with such a complicated question as that?

Mr. Baggallay: We stated last year that we should soon have to come for further capital powers.

Witness: I think I said we should be coming this year.

Mr. Littler: I cannot find that in the evidence. What land have you covered with works at Beckton?

Witness: We have 596 acres, 390 acres of which are covered with works.

You have a good deal of land uncovered, which is available for extension of works?—Yes. The necessity for increased land is this: Local Authorities are becoming more and more anxious every year to save their districts from the nuisance attendant upon the presence of gasworks; and we must get a belt of land wherever we can round our works.

You possess already more land than you will want for the next ten years?—Not to maintain that belt of land round our works.

Your undertaking is four times the size of the South Metropolitan?—Yes.

And the larger an undertaking, the more cheaply you ought to be able to manufacture?—Yes, as a rule; but there are special circumstances in our case which prevent our doing so.

In further cross-examination, witness adhered to the view that he had already expressed that the distance of some of their testing-stations from the works necessitated something being done to enrich the gas. He admitted that the cost of some of the enriching materials was less now than it was in 1876. In that year they used cannel coal, and nothing else; but now they employed carburetted water gas. One-third of their output was enriched with cannel and carburine spirit. Water gas was cheaper to manufacture than coal gas.

Mr. Littler: And therefore, as compared with 1876, your enriching, as to two-thirds of your output, instead of being more costly than it was, is less so?

Witness: But the testing requirements are now more rigorous than they used to be.

With regard to reduction in the price of gas, is it not the fact that since 1878 the South Metropolitan Company have reduced their price 1s. 3½d. per 1000 cubic feet, while in the same period you have only reduced yours 9¼d.?—Yes.

In 1884 the difference between you was only 4d.?—Yes. In 1897 it was 6½d. to our disadvantage, in 1898 8¼d., and in 1899 9¼d.

Then you have been progressively increasing in your disproportion of charge for the last fifteen years?—Yes. The reason for this, to a large extent, is that the South Metropolitan Company have had a much larger increase in their business than we have had. Between 1883 and 1898, we have had an increase of 41 per cent., whereas the South Metropolitan Company have had an increase of 121 per cent.

The proportion of manufacturing charges has reduced?—Yes. Ours were 3d. more than theirs formerly; and they are now 2·59d.

How much of your make do you sell under your obligation with the London Gas Company at 2s. 2d. per 1000 cubic feet?—Out of a total sale of 21,000 million cubic feet, 19,000 millions are sold at the higher price of 3s. per 1000 cubic feet. The scheme we arranged with the London Gas Company was before the Board of Trade.

And they granted it. Why are my clients, who have nothing to do with your bargain, to pay so that you may make 12¾ per cent. on your capital and keep your obligations with the London Gas Company?—The matter was fully dealt with at the time of the amalgamation, when the question was before the Board of Trade.

Without this arrangement you could sell gas cheaper than you do, and still maintain your dividend. However, we will not discuss that now. What is your anticipated increase in the next twelve years?—I should think about 9000 million cubic feet.

This does not accord with the figures for the last few years. In 1889, your output was 18,100 million cubic feet; in 1890, it was 18,536 millions; in 1891, 19,000 millions; in 1892, 19,100 millions; in 1893, there was a decrease, for the figure was 18,200 millions; in 1894, it was 18,200 millions; in 1895, 19,200 millions; in 1896, 20,100 millions; in 1897, 21,000 millions; and in 1898 there was a decrease again—viz., 20,900 millions?—The average increase between 1876 and 1898 has been just over 3 per cent.

You have given the Committee as an explanation of the higher price, that you have not made the increase you might have expected in consequence of the introduction of the electric light?—Yes, it has been partly owing to that, and partly owing to the weather. I was careful to say that the increase in the consumption of gas depends now more than formerly on the weather. We have a great many stoves in use.

Does not the rate of increase in the demand depend on the gas being cheap?—No. Take the case of the Commercial Company; they sell nearly as cheaply as the South Metropolitan Company, yet their rate of increase has been only just above ours.

You now introduce a new comparison for a particular purpose?—You say that the low rate of increase in these Companies is consequent on the price; but I tell you that it has not had the immediate effect on the consumption that you imagine.

At any rate, we have the comparison. Is it not the fact that the greater proportion, if not the whole, of your increase is due to the penny-in-the-slot system—is not your ordinary consumption either stationary or going back? Your books show an enormous increase in the number of automatic meters?—The increase is not dependent on that entirely. It is a cause of increase; but we have a large increase independent of that.

A Member of the Committee: How much of the increase is due to the introduction of cooking-stoves?

Witness: I cannot tell precisely, as there is no distinction made in the houses. I should estimate about 100 million cubic feet a year.

Mr. Littler: Is it not the fact that, ordinarily, for every increase of a million feet, an additional expenditure of between £300 and £400 is estimated?

Witness: That is the generally accepted figure.

What is your figure as to your future expenditure per million cubic feet?—From £300 to £350.

Do you propose to issue your capital subject to all the conditions and restrictions of the Act of 1876?—Yes.

Then do you or do you not consider that clause 18 of the old Act should apply to your new issue—the clause which says that before raising new stock the Company shall satisfy the Board of Trade, and that the President of the Board shall present a certificate to that effect; an opportunity being afforded to the Local Authorities to be heard?—That clause is not incorporated in the present Bill.

Why not?—Because there is already an Auditor, who examines the accounts in the fullest detail. The other inquiry is a perfect farce. It is conducted by people who know nothing about gas matters.

Then the clause should be improved?—I do not think any outsiders can satisfactorily deal with these matters. I would suggest that it should be made obligatory to appoint a gas expert.

Is there any Company, including the South Metropolitan, who have so big an income per mile of main as yours?—I dare say not.

Cross-examined by Mr. Pember: You estimate that your expenditure for the next ten years or so will be £3,675,000?

Witness: Yes.

In 1888, you sold 17,288 million cubic feet of gas, and in 1898 you sold 20,977 millions; so that in the ten years your increase was 3689 millions?—Yes.

I suggest to you that if you should increase in the next decade in the same ratio, it will be 3689 millions again?—We should be to blame if we made our calculation on the assumption that there would be no severe weather.

If you took it at what it has been in the last decade, instead of wanting £3,500,000 of new capital, you would only want £1,100,000?—The weather of the last five years has been notably altogether exceptional.

Is not the fact that you have a new competitor in the electric light a reason for supposing that the capital required will not be so much?—We have two additional supplies—the automatic meters and the stoves—to provide for.

What is the amount of the increase you attribute to the automatic meters?—1500 million cubic feet. The supply began in 1894; but the first full year's return I have is 1896, in which it was 760 million cubic feet.

Witness, in answer to further questions, said that every year for some years past they had obtained a loan from their bankers, because, owing to the cheapness of money, they obtained it at a lower rate than if they went to their shareholders.

Cross-examined by Mr. Morton, on behalf of West Ham, witness said the cost of the gas was greater in the case of his Company than it was in that of the Commercial Company. They only supplied £43,000 worth of gas in West Ham per year; but West Ham must bear its fair share of the Company's capital expenditure. Possibly if they were dealing with West Ham only, there would not be any greater outlay in the case of his Company than in that of the Commercial Company. The lands at Beckton had been already bought in the names of trustees, which was an advantageous way of acquiring them.

In re-examination, witness said that in amalgamating with the eight other Companies they had to take over the whole of their capital as going concerns; and all this capital still had to bear its share of interest in the amalgamated Company. It was incorrect to say that the Company had the largest number of consumers per mile of main of any Company. They had taken a twenty years period on which to base their estimates, because it offered a mean between extreme decades—namely, an increase of 3 per cent. per annum—and on this basis £3,500,000 new capital would be necessary.

By the Chairman: Their present price would have paid a dividend of 12¼ per cent. on the stock as unconverted; on the new capital it paid £4 18s. per cent.

Mr. G. C. Trewby, *examined by Mr.* Danckwerts,

said he was at present Consulting and Constructing Engineer to the Company. He had planned all the works of the Company during the last fifteen years, and had made provision for the increased output necessary; and he had always done so with a view to the greatest economy and efficiency. During the last winter, they had had a margin of capacity; but if it had been cold and foggy, the whole of their manufacturing capacity would have been required. They must always keep up the pressure, and be prepared to supply the maximum demand. On one day in December, 1891, 128,207 million cubic feet of gas were sent out—or the 161st part of the whole annual output of the Company, and more than double the average daily output. During the whole of that week, 292,000 million cubic feet were supplied. An increase of 3 per cent. in the demand for gas was estimated in the next twelve years, which would amount to 8930 million cubic feet; and on this basis, at £392 per million for all purposes, the sum required would be £3,500,000 sterling. He did not regard this as at all an excessive estimate, as compared with those made by other Companies. At the end of twelve years, the Company would have to be prepared to supply to the consumers 47 million cubic feet in 24 hours, which would mean that they would have to be prepared to make 50 million cubic feet a day.

Cross-examined by Mr. Littler, witness admitted that the consumption on the day in December, 1891, to which he had just referred was

altogether abnormal, and had not been repeated. It was true that the greater part of their district was built upon. The Company expected a further increase from the use of automatic meters. He was not aware that the automatic supply demand had become almost stationary.

Mr. FIELD, *re-called*,

stated that he had ascertained the expenditure on works, service-pipes, meters, and stoves in 1897 and 1898. In the first year the expenditure on works was £152,000, and in the second £141,000. In 1897 it cost £65,500 to connect service-pipes, and in 1898 £58,500. In 1897 meters cost £90,000, and in 1898 £67,000. In 1897 stoves cost £60,500; and in 1898 they cost £41,500. The net capital expenditure for 1897 was £359,500, and for 1898 £295,000.

Mr. G. F. L. FOULGER, *Distributing Engineer of the Company*,

said he estimated that in the next ten or twelve years it would be necessary to spend £125,000 on the high-pressure and trunk mains, on the 8-inch or smaller service-mains £80,000, on wrought-iron pipes £75,000, on new ordinary meters for the extension of business £140,000, and on gas-stoves £230,000. With reference to the automatic services, he estimated that penny-in-the-slot meters would cost £380,000 in the same period, stoves £190,000, and services in connection therewith £180,000. The total expenditure he thus estimated was £1,400,000. The number of consumers was continually increasing, though the amount of the individual accounts might drop.

Mr. T. WILTON, *Superintendent of the Residuals Department at Beckton*,

said he estimated that the total requirements in his department during the next ten years would involve a capital expenditure of £75,000.

This closed the case for the promoters.

Friday, April 14.

Mr. LITTLER, for the Corporation of London, said that when the Bill was first before the Committee, and the appearances were entered, he had ventured to suggest the difficulty in which his clients felt themselves; and had asked the Committee to be kind enough to assist him in finding a remedy. The Committee had not done so. The Committee had not been able to adopt any of the courses he had indicated as being possibly open to them; and his clients could not conceal from themselves that they were placed in a difficulty with regard to presenting to the Committee the objections which they had to the scheme. There could be no question that a very great deal of light would be thrown on the discrepancies which were shown to exist, and which had increased very materially during recent years, in the prices charged as between The Gaslight and Coke Company and the South Metropolitan Company. The Corporation were very reluctant to do anything that might tend to what might be called a partial hearing of that which concerned the whole subject; but the Committee having decided that it was their duty to deal with the Bill as it came before them, the opponents were bound to speak upon the measure as it now stood. They would present such considerations as occurred to them, in the desire, however, not to prejudice or hamper themselves, representing as they did the public consumers. The future would take care of itself, because, by the time the Bill got elsewhere, the parties would have received further information as to what was to take place as the result of the public inquiry instituted by the House of Commons. He did not say that the attitude of the petitioners then would be the same as that they felt themselves compelled to take under existing circumstances. The petitioners accepted the view of the Committee as being the right thing to do; but this was a very serious and important question. The lighting of any portion of a great town in the country was a matter which, next to water supply, was of the greatest possible importance. But in this case they were dealing with an area which, for wealth and population, had no equal now, and never had had an equal since the world began; and the method by which lighting was to be carried on, and the rates which were to be charged for it, were obviously extremely important questions. In this matter, the Corporation of London were asked to be quiet, and to stand by while this great Gas Company—the greatest lighting company in the world—acquired powers which would enable them to avoid coming to Parliament, according to their own calculation, for the next twelve years. If they were wrong, and if the Committee took the ordinary methods of calculation, it might be found that the period would be longer than twelve years—that it might be anything between twenty and thirty years. But take it at ten or twelve years, this would be a serious length of time to the community he represented. A large district of consumers during this period would be prevented from discussing the desirability of placing restrictions on the lighting authority. He was not, at this time, going to discuss the question of purchase. The statements made relating to it in the petition had only been inserted to convey the impression that the idea of purchase had never been given up. The Corporation did not present this subject to the Committee as being a matter to which they should give immediate consideration, because there was no Bill for purchase before Parliament; but he would remind the Committee that the acquisition of gas companies was a subject open to discussion. He did not say that Parliament had ever decided—it would be a bad day if they ever did decide—that all gas undertakings should be bought by the local authorities. It would be a bad day, that was to say, for himself and his learned friend Mr. Claude Baggallay. What the Corporation said was that if such conditions as existed in the case of The Gaslight and Coke Company's affairs were to exist generally, local authorities would be driven to apply to Parliament for power to purchase. If there was a probability that purchase might be necessary within a measurable period, the Corporation, as representing the consumers, would have to turn their attention to the matter in order to take care of the interests of those they served. In the House of Lords, in the Company's Bill of last year, a saving clause was inserted to the effect that nothing in the Bill should be taken to enhance the selling price. If no such clause were inserted in the present Bill, the effect would be very serious. It was not an easy thing to promote a Gas Bill having for its object compulsory purchase, unless under very exceptional circumstances, and still less was it easy to do anything with a Company if they felt themselves absolutely independent of Parliament and of the local authority for a long series of years. Of course, a Company could not be exactly independent of Parliament, because Parliament could do what it thought right in any case that came before it, and could not be tied by precedent. But the hands of local authorities might very easily be tied. The Company declared that, assuming their expenditure in the future took place on the basis of the expenditure during the past three years, they would, after providing for this year's working, have only a balance of £60,000 with which to deal. But if this were true now, it was equally true last year; and the Company must have known it. They knew more than that; they knew how difficult it was for Parliament to visit, not upon themselves, but on the consumers, their wrong-doing, and to reject a Bill like this altogether. In the event of a Bill to enable the Company to perform their statutory obligations being rejected, it was the consumers, and not the Company, who suffered; and the promoters knew that a Committee of the House of Commons who felt this, would be inclined to do more for them than they would do under ordinary circumstances. The Company in this case had advisedly and deliberately kept away from Parliament, with the very object of inducing Parliament to look upon them sympathetically, instead of regarding them with the eye of business men. Naturally the Committee would say to themselves: "What are we to do? Here is a Company with no money to go on with!" The Chairman, in the course of these proceedings, indeed, had said that the Company must have some capital; and this was what he (Mr. Littler) had been feeling all the way through the inquiry—that was exactly his difficulty. The Company had allowed things to go on until a time when the refusal of the powers which they were seeking would effect the consumers more than themselves. But the observation which naturally arose was that upon the bed they had made they must lie. With regard to a large part of their district, he would point out, the Company had rather miscalculated their market. They had, perhaps, forgotten that the public were not absolutely dependent upon them for their lighting. A large section of their customers could avail themselves of the electric light—in fact, this observation would apply to all but one or two limited areas which were not of such a business character. Why were the Company coming to Parliament and asking for so large a sum of money as £3,500,000? Let the Committee remember the position the Company occupied. It was something marvellous. Before their capital was, he would not say "watered," but re-arranged, the total capital of the Company was £13,455,000. This was an enormous amount; and surely with so much capital involved, and with such extensive operations as it necessarily implied, there ought to be the cheapest working. Mr. Field had told them that they were not carrying on their operations solely at Beckton, but that they had subsidiary works in various parts of the Metropolis, which involved great expenditure in working. But if the Company were proposing to continue works which were extravagant, they had no right to come to the House and ask for a maintenance of all their existing privileges. Either they should not have these subsidiary stations, or the stations were such a source of profit to them that it was better for them to work there than to take all their operations to Beckton. Mr. Field had pointed out that, in the course of their history, they had had to pull down four different sets of works; and that gentleman was asking to have the benefit of the sliding-scale on the capital spent on these works, and to be able to divide over 12 per cent. profit on it, and to charge the petitioners a high price for gas in consequence. To make such a proposal was like a tailor charging £10 for a coat which was only worth £5, on the plea that he had been turned out of cheap premises by the London County Council, and had been compelled to occupy dearer ones in consequence. In the case of such a tailor, a man would simply go to another tradesman, who would charge him £5 instead of £10; but the gas consumer could not take a course analogous to that. Parliament had set its face against the multiplication of gas companies, for it was an intolerable nuisance to have the streets broken up by too many authorities. But the proposition that the Company were to have their full dividend under all circumstances was one which he demurred to on the part of the Corporation of London. Parliament had not guaranteed the Company their full dividend; and there was no reason why it should be maintained by artificial means. Parliament could surely say: "You are charging too much;" and though it was rare for Parliament to interfere in the matter of price, it could do so, and had done so, in the interests of the consumers—being determined to see that the consumers derived those benefits to which they were entitled. In 1876 the difference between the price charged by The Gaslight and Coke Company and the South Metropolitan Company was 9½d. per 1000 cubic feet; but since then it had risen to 1s. 3½d.

Mr. BAGGALLAY said that the difference was 9d. still, or within a halfpenny of what it had been. His learned friend had made the difference by taking his figures from the standard, and not from the actual price.

Mr. LITTLER said the difference between the initial charge, on the amalgamation of the three Companies, of the promoting Company and the South Metropolitan Company, which had been 9½d. per 1000 cubic feet, was now 1s. 3½d.—that was to say, The Gaslight and Coke Company were 6d. worse in the comparison than they had been. Why was it that the greatest Gas Company in the world—with all their capacity, and, as they had heard from their own witnesses, with a prospect of in ten years' time adding 9000 million cubic feet to their annual output—had been going back since 1884, and creating such an outcry that Parliament at last had been obliged to institute a public inquiry by means of a Committee to find out the meaning of it? He had asked Mr. Field if it was not possible for the promoters to manufacture more cheaply; and that gentleman had replied in the negative. He (Mr. Littler) was unable to make out why this should be. The Gaslight and Coke Company made more gas per ton of coal carbonized than almost all the companies in England, though it was true that they enriched their gas a little more than some companies. They had 156 consumers per mile of main—a larger number than any other company in the world. Why then was it that they demanded from one section of the public 3s. per 1000 cubic feet of gas? He had asked Mr. Field whether it was not the fact that since 1891 the Company had denuded their reserve fund of over half-a-million of money; and Mr. Field had replied: "Yes, we have done so; but we have taken that course for the benefit of the consumers." But this statement he (Mr. Littler) did not agree with. Mr. Field assumed that the Company were entitled to keep up their price, which was not the fact. It did not matter to the consumer whether the shareholders obtained something or nothing;

but it did matter to him that 10 per cent. of the Company's consumers were getting the same gas manufactured in the same way at the same works for 2s. 2d. per 1000 cubic feet, while he was paying 3s. for it. This was a consideration which the Corporation had a right to put before the Committee, and which the Committee were entitled to take into account in deciding what should be done. The Corporation had nothing to do with the considerations which had led to the amalgamation of the Companies. The promoters said that the Corporation had had an opportunity of objecting to the amalgamation; and this no doubt was true. But they very naturally had not thought that the result of the amalgamation would be that the difference in price between two sections of the community would be increased rather than reduced. For his own part, he was at a loss to imagine to what this difference in price between one Company and another was due. Was it owing to bad management? There must be something wrong somewhere. Could the Committee find some feasible ground for it? Why was it that the greatest Company in the world could not produce gas more cheaply than at 3s. per 1000 cubic feet? They found all over the country—north, south, east, and west—that the prices were lower than in the district of The Gaslight and Coke Company. Take the case of a small town like Rochester, this was supplied—and that, too, by a Company—at 2s. 6d. per 1000 cubic feet, while The Gaslight and Coke Company charged 3s. And the Rochester Company only carbonized 41,643 tons of coal, as against 2,143,000 tons in the case of the larger Company. He had asked Mr. Field if he could name one town in which over 100,000 tons of coal were carbonized, where the charge was anything like as high as that of The Gaslight and Coke Company; and Mr. Field had replied that he could not. Mr. Field had said that one thing which accounted for the difference was that the illuminating power of gas in the country districts was less than that of his Company's gas; but it was idle nonsense to contend that the gas examiners did their work more perfunctorily in the country districts than in London. He would ask the Committee to say that the Company should not have the privileges they were asking for for the mere purpose of keeping up their dividends. What harm would they be doing by letting the Company wait another year for the powers they sought? They had enough money for this year, and some £60,000 to spare. The Committee might depend upon it that the Company would do their duty to the public, even if the Committee asked them to go home again now, put their house in order, and come again for the Bill next year. They wanted money for a prospective increase of 9000 million cubic feet of output, which would last them twenty years, and he had asked Mr. Field if they had ever before made such an application to Parliament. Mr. Field had replied in the negative. Why did they ask for so much money here? They could not want it. Save in connection with the penny-in-the-slot system, their general working had decreased since 1891. In that year there was one occasion upon which an abnormal demand was made upon their resources; but such a demand had not occurred since. He (the learned Counsel) pointed out that no one had been called before the Committee by the Company, except their own officials. Not a single person had been called to justify the twenty years or the 9000 million cubic feet increase. The promoters had proved his (Mr. Littler's) case out of their own mouths. They had enough money to go on with, and could come again for powers during another session of Parliament. He could not close his eyes to the fact that the Committee might not be with him; but even if they passed the preamble of the Bill, he hoped that they would not allow the promoters more money than was necessary, pending the decision of the inquiry instituted by the House of Commons as to the price of gas. In conclusion, he maintained that there was no urgency for the Bill, and that the refusal of the present application would not be doing any injustice to the promoters.

The CHAIRMAN said that Mr. Pember had called the attention of Mr. Littler to a clause put in the Bill of last year on the subject of purchase. He should like to have a copy of that.

Mr. BAGGALLAY said that the clause referred to was clause 19 of the Act of last year. When the Company had asked for power to consolidate and convert their stocks, in the House of Lords, Mr. Talbot argued for the London County Council that supposing hereafter at any time they were to purchase the Company's undertaking, this splitting of the stocks would enhance the value on the Stock Exchange of the capital of the Company, or the apparent value of the undertaking. The Company contended, on the other hand, that any purchase which took place could not, according to all custom, be upon the market value of the shares and stocks, but must be on the maintainable and divisible profits of the Company. Lord Camperdown, who was Chairman, then said that, in order to make it clear that, supposing at any time there was a purchase, any enhancement of the value in the market should not affect the price to be paid, they would put in a clause to say that the market value should not be the basis of the arrangement. There was no capital raised under the Bill; the measure only applied to the conversion of stock.

Mr. PEMBER then addressed the Committee on behalf of the London County Council. He said that all Mr. Littler had desired to do had been to remind the Committee of the clause just referred to, and to say: "Do not believe that all idea of purchase has been given up." He (Mr. Pember) did not think it would be right for him to follow Mr. Littler over the ground he had traversed on behalf of the Corporation of London; and he would content himself with saying, in regard to a great deal that had been urged before them, that he accepted his learned friend's arguments, and cordially endorsed them so far as they had put before the Committee the fallacy which seemed to underlie the promoters' case as to the amount they were charging the consumers of London. He endorsed his learned friend's view that the Committee could rightly and properly check their price, and that, morally, they were entitled to check it, because, either through bad management of their own or owing to the fact that they were unfortunately situated, their capital account was very high. The consumers of London did not exist for finding a large amount for the shareholders of the Company on their capital account. As to the maximum dividend allowed them, Parliament had only permitted it because theirs was a risky business. The Company had secured this right; but it was no argument in favour of their price being maintained if, either through their own folly or by accident, their capital account was higher than that of other Companies. The opposition of the London County Council referred to a different matter. The County Council felt, and he felt, that the Committee were not in a position which would enable them to go into the question of what the initial price of the Company ought to be. The House had instructed one of its Committees to inquire into this subject; and before this Committee all the circumstances which could be dealt with for the sake of information would be brought to bear on the inquiry on both sides. Anything which could be done here would be inchoate and imperfect; and what the County Council said was that the Company should not enjoy, by a decision of the present Committee, a long period of immunity. If the Committee came to the conclusion that something should be done to settle the price, the consequences attendant upon the report would be what they had been on previous occasions—that was to say, Parliament, when a Company came to them for further powers, would take the opportunity of dealing with the question of the price of gas. He maintained that on the eve of such a possibility as that, no Company should get from a Committee so long an immunity from parliamentary interference as this Company would if they obtained anything like £3,500,000. In 1875 the question of the price of gas was thoroughly thrashed out before Mr. Forster's Committee—so much so that in 1876 all need for the discussion of the financial provisions of the Company's Bill had disappeared. He wished to guard against a contrary condition of things being brought about in the present case. He had made a certain calculation as to what would be the result if the Company obtained their £3,500,000—that was to say, how long it would enable them to stay away from Parliament. He had proposed to take the last decade as a guide for the future; but to this Mr. Field had objected. He had asked Mr. Field what the sale was 14 years ago, and had been told that in 1884 it was 15,251,603,000 cubic feet. The witness had admitted that he (Mr. Pember) was right in saying that the sale in 1898 was 20,977,374,000 cubic feet, or an increase in the fourteen years of 5,725,761,000 cubic feet. If they divided this figure by the fourteen years, it worked out at just over 400,000,000 cubic feet per annum increase. He took this as the increase since the Company had assumed their definite and final shape. To apply this to the present case, if the rate of increase in the future was as great as it had been in the past—and he very much doubted whether it would be, owing to the competition of the electric light—with an expenditure of £400 per million (the Engineer to the Company having given it at £392), they would spend in ten years £1,600,000. If, therefore, the increase during the next ten years was going to be as great, year for year, as it had been during the last fourteen years, out of £1,600,000 they would get permission for an expenditure of £400 per million feet, which was more than their own figure. Reducing this to a single year, it meant £160,000. This being so, the £3,500,000 the Company were asking for would last them for about 22 years; so that, instead of giving them immunity for some twelve years, as Mr. Pope had suggested, the Committee, by granting these powers, would be giving it for 22 years. The County Council contended that this was an improper period of immunity under all the circumstances. They held that money in hand for a couple of years was the most the Company should have. If the Company had pressing necessities, they could meet them by temporary loans, which they could get rid of out of income, as they had done in the past. Mr. Field had said that after meeting the capital expenditure of the present year the Company would have only £60,000 in hand. If £250,000 were added to this, the Company would have over £300,000. It would be mischievous to give them more than this on the eve of the inquiry by a Select Committee as to the price of gas. Clearly they should not be allowed the enormous immunity from parliamentary control for which they were asking. If the Committee gave them anything at all, £200,000 or £250,000 would be ample.

Mr. MORTEN then addressed the Committee on behalf of the Corporation of West Ham. In describing the special circumstances under which this Corporation petitioned against the Bill, he said they had in one street gas supplied by the promoters to consumers at 3s. per 1000 cubic feet, while in another street they had the Commercial Company supplying it at 2s. 6d. The consumers consisted mostly of members of the working class to whom the price of gas was of material concern. It was hard to convince people of this kind that there could be any equity or fairness in allowing one Company to make charges in certain streets largely in excess of those made by another Company to residents in an adjoining street. When complaint was made, what was the answer received? Why, that The Gaslight and Coke Company had amalgamated with other Companies, and had incurred obligations largely in excess of those they would have had to bear if the terms of amalgamation had been different. To this the consumers said: "Your works in our district are adequate to supply us, and of a character to enable you to supply us at a cheap rate."

Mr. BAGGALLAY: Do not the West Ham Company, who supply a part of your district, charge 3s. per 1000 cubic feet?

Mr. MORTEN said he did not know about that. The West Ham Company supplied another section of the district altogether; and he must protest against a learned Counsel for the promoters attempting, by a side wind, to give evidence. He (Mr. Morten) maintained that the charges made by The Gaslight and Coke Company pressed heavily and unfairly on his clients. As for the other questions which had been raised, he supported the arguments which had been offered on behalf of the London County Council and the Corporation of the City, that every possible safeguard should be imposed on the Company for the benefit of the consumers, in granting them the powers they sought.

The room was then cleared, while the Committee remained for some time in private deliberation. On the re-admission of the public,

The CHAIRMAN said: The Committee decide that the preamble of the Bill is proved, but they make it a condition that the amount of new capital applied for be reduced to £2,500,000. With reference to the auction clauses, the Committee suggest that they should be made quite clear to the satisfaction of the Local Authorities concerned.

Mr. BALFOUR BROWNE: The promoters have satisfied Lord Morley in the other House; but if the petitioners have any suggestion to make, we shall be quite willing to listen to it.

The CHAIRMAN: In view of the probabilities of the purchase of these undertakings at some period or other, the Committee wish to give every facility that it shall be done on fair terms.

Mr. RIGG, for the City Corporation, inquired whether the Committee, in making the suggestion as to the auction clauses, had in their mind a remark made by Mr. Littler, who drew the attention of the Committee to clause 18 of the Act of 1876 dealing with restrictions on raising capital.

The CHAIRMAN: No; we were very anxious that the auction clauses should be quite clear, because we regard that as important.

Counsel for the petitioners then withdrew; thus reserving their right to further oppose the measure.

The Committee afterwards proceeded to go through the clauses, in which the alteration in regard to the amount of capital to be raised was made, together with some verbal corrections. In deference to an objection taken by the House of Lords, an alteration was also made in one of the clauses dealing with the issue of the new stock, the effect of which will be that the debentures issued under the Bill will rank, not as originally proposed with the existing consolidated 3 per cent. stock, converted under last year's Act, but next to that stock, and *pari passu* with all principal moneys secured on mortgage.

HOUSE OF LORDS COMMITTEE.

(*Before Lord* FERMANAGH, *Chairman, the Earl of* MALMESBURY, *Viscount* FALKLAND, *Lord* NORTHBOURNE, *and Lord* MUNCASTER.)

AIRDRIE AND COATBRIDGE WATER BILL.

This Bill, the object of which is to enable the Airdrie and Coatbridge Water Company to amend their Act of 1892 by substituting another reservoir for that which was thereby authorized on the Cowgill Burn, and to obtain power to raise £75,000 of additional capital, came before the above-named Committee on the 20th ult. It was opposed by the Corporations of Airdrie and Coatbridge and by the District Committee of the Middle Ward of Lanarkshire.

Mr. BALFOUR BROWNE, Q.C., Mr. WORSLEY TAYLOR, Q.C., and Mr. ERNEST POLLOCK appeared for the promoters; the Hon. J. D. FITZGERALD, Q.C., Mr. FORBES LANKESTER, and Mr. GULLY, for the opposing Corporations; Mr. CLAUDE BAGGALLAY and Mr. B. NICOLSON, for the District Committee.

In opening the case, Mr. Balfour Browne said the object of the Bill was to empower the Airdrie and Coatbridge Water Company to abandon certain works authorized by their Act of 1892; to construct other works; to amend the provisions of the Act of 1892; and to raise additional capital. The Company was incorporated in 1846, since which time the works had been considerably extended. In 1892, Parliament sanctioned a greatly increased supply of water by authorizing the construction of additional reservoirs on the Cowgill and other small burns. The capital authorized in 1892 was estimated to leave £33,000 in hand to provide for extension of mains, &c.; but, unfortunately, the works had been found to cost far more than was anticipated, and the Company were now at the end of their tether in respect of funds, owing to engineering difficulties which had been encountered. The maximum rate under the Act of 1892 was 2s. in the pound of rateable value. Up till last year they had been able to keep it down to 1s., which was a very reasonable amount; but, seeing the increased expenditure on works which had not become remunerative, they had had to increase it to 1s. 4d., which was a very favourable rate when compared with some towns even bigger than Airdrie and Coatbridge. The principal difficulty had been met with in connection with the Cowgill reservoirs, chiefly in the way of finding a solid bottom. One (No. 5) had been nearly completed; but it had been found impossible to construct No. 6 on the site originally chosen, on account of the absence of a solid substratum on which to erect the embankment. They were therefore obliged to go 250 yards farther up the stream. The proposed reservoir would be smaller than the one sanctioned in 1892, but there was no help for it; and it was believed that the substituted reservoir would meet the needs of the case. The additional capital they were now seeking—viz., a sum of £75,000—was absolutely necessary. It was rather hard that the Company should be opposed in this application by the Corporations of Airdrie and Coatbridge, because those Corporations had full opportunity to purchase the works in 1892; but they refused to take advantage of it. Besides, it was not in accordance with precedent that a Company should be required to put a clause in a Bill compelling them to sell their undertaking; and he was certain that no Committee of their Lordships' House would consent to such a proceeding.

The first witness called was Mr. P. Taylor, the Manager and Secretary of the Company. In answer to Mr. Worsley Taylor, he said that up to 1892 the Airdrie and Coatbridge Corporations had told the Company that they were not going in for providing water themselves, and that the Company must obtain the additional quantity required. The Corporations had approved of what the Company had done until they were compelled last year to raise the rates. The estimates of the cost of the works under the 1892 Act were carefully prepared; but unforeseen engineering difficulties arose, and it came about that, instead of there being left a surplus of £33,000, as they had expected, all the estimates had been exceeded. In the construction of No. 5 reservoir they expected to get a solid foundation at a depth of 14 feet; but they did not find it until they reached a depth of 60 feet. This meant an additional cost of about £13,000. In their attempt to construct reservoir No. 6 they put down four shafts; but they could not get a satisfactory foundation at a depth of 40 feet. When they reached that depth, they came to the conclusion that they must abandon the site. It was only when they went 250 feet farther up the stream that they found a good spot. Their Engineer was satisfied that at this point they could construct a safe embankment. They got solid ground at a depth of from 10 to 15 feet. The reservoir would be smaller than the original No. 6; but it would be sufficient for the public requirements. The flow of water from Roughrigg in a dry year was about 726 million gallons; and it was expected that from the Cowgill Burn it would be 883 million gallons. From this there had to be deducted 306 million gallons a year as compensation water, and 146 million gallons sent to the Upper and Middle Ward District Committees. The result was that there remained 431 million gallons to be passed to the works at Roughrigg. This meant an increase on the present supply of nearly 50 per cent. In addition to the excess on the estimates, the Company had to meet expenses which had not been anticipated. He put in a financial statement showing the position of affairs. Under the Act of 1892, the estimate of expense of the works, including land and contingencies, was £116,723, of which there was applicable to reservoir No. 6 at Cowgill Burn, now proposed to be abandoned, £20,109, reducing the estimate of expense to £96,614. The actual costs of the works, so far as they could be ascertained, would, when finished, have exceeded the estimate by £58,900—making roughly a total of £155,500. To this had to be added the estimated cost of the new reservoir proposed in the Bill—viz., £14,233—bringing the amount up to £169,733, and showing a deficiency of £19,733 on the capital authorized by the Act of 1892. To this deficiency there had to be added items amounting to £55,451, which with the deficiency of £19,733 made a grand total of £75,184 of capital required. In respect of rating powers, it was necessary that the Company should have a margin of charge, so as to get a good premium for these shares. They had not charged more than they were obliged to. The people who had invested in their shares had done so on the faith of Acts of Parliament, passed with the assent of the Local Authorities; and he did not think it was fair that, at the instance of those Authorities, there should be any alteration made in the Company's rating powers.

In cross-examination by Mr. Fitzgerald, witness stated that the Company had paid their maximum dividend of 10 per cent. since 1868. Up till 1892, the expenditure on works amounted to £78,000. When the works authorized by the Act of that year and those now proposed were completed, the cost under the two Acts would be £170,000, so that for getting an additional supply of about 50 per cent. they were to be at more than double the cost of the Roughrigg works. But there was the sum of £6000 as between the original No. 6 and the present proposed reservoir. The difference between the estimated cost of the new works in 1892 and the present estimate was no less than £59,000. He did not think they had been careless in preparing the estimates in 1892. Their expectations had not been realized. He acknowledged that the whole of the extra expense fell upon the consumers of water. The negotiations for the purchase of the Company's undertaking in 1888 fell through because of the failure of the Corporations to agree among themselves. He had no hesitation in saying that the Company would part with their undertaking if they got a proper price for it; but he thought the Corporations should leave the matter alone until the proposed works were completed, which would be about three years hence.

Replying to Mr. Baggallay, witness said the storage capacity of reservoir No. 6, as designed in 1892, was 160 million gallons; while that of the proposed reservoir in substitution of it would be 36 million gallons. The compensation water provided by the Act of 1892 was to remain unaltered. He thought this was fair enough. There was no necessity to put upon the Company an absolute liability to supply 200,000 gallons a day to the Lanarkshire Middle Ward. Although they were reducing the storage capacity, they would not have less water; and the Middle Ward Committee would not get less. So far as the Upper Ward was concerned, their supply would be certain.

Mr. W. Clark and Mr. A. Frew followed with evidence in support of the engineering details and estimates.

On the resumption of the proceedings the next day, Mr. G. M'Creath, an engineer of Glasgow, stated that under the Bill there would be an ample supply of water for everybody in the district entitled to obtain it. Even if further storage capacity were required, it could be obtained upon the Cowgill Burn. Instead of the Middle Ward Committee getting less compensation water by the Bill, they would be better off than under the Act of 1892, as they could draw upon the Roughrigg as well as the Cowgill reservoirs. Mr. J. M. Alston, a Director of the Company, strongly objected to any proposal to cut down this rating power, as it would, he said, be a breach of faith to those who had paid a considerable premium by auction for their shares, in the belief that the Company's maximum rating power was 2s. in the pound. Although this was the maximum, only 1s. had been charged until recently, when the rate was raised to 1s. 4d. Former proposals to purchase the Company's undertaking had fallen through, because the Local Authorities could not agree among themselves; and he thought it very hard now, when the Company were embarking on the proposed large expenditure, that they should have the power of purchase held over their heads.

This was the promoters' case.

Without calling witnesses, Mr. Claude Baggallay proceeded to address the Committee in support of the petition of the Middle Ward District Committee of Lanarkshire; declaring that all his case was to be found in the documents already in the possession of their Lordships. The Middle Ward Committee, he explained, was the Local Authority, under the Public Health (Scotland) Act, for the large district lying south-east of the burghs of Coatbridge and Airdrie, and that lying between the proposed works and those authorized in 1892 and the district to which the water was supplied; being along the line of the river, near which the water was to be taken. In the next place, the Committee were the Water Authority under the statute. They were responsible for seeing that their district was properly supplied; and it was this body who came before the Committee to draw attention to the alteration that was being effected by the present Bill compared with what was arranged under the Act of 1892. Mr. Worsley Taylor had passed over the petition he (Mr. Baggallay) represented, and confined his speech largely to an appeal to their Lordships not to increase the Company's obligations when the means of carrying out those obligations were being seriously crippled. The storage ought to be sufficient for the water. In 1892, Counsel for the promoters said the storage of 160 million gallons was right and proper; now he said 36 million gallons were sufficient. He must be wrong in one case or the other; whichever way he took the agreement of 1892 which was entered into by the parties—the Company on the one hand and his (Mr. Baggallay's) clients on the other—they were relying upon the storage capacity of 160 million gallons. If the storage capacity was seriously crippled, it came to this—that the security for the storage of water intended to be given under the Bill of 1892 was seriously reduced. The storage was an all-important matter. In this case, he claimed that his clients were entitled to have their supply made secure.

The case for the Corporations of Airdrie and Coatbridge was next taken.

The Provost of Airdrie (Mr. J. Connor), in answer to Mr. Fitzgerald, said it was generally felt in the town that the water undertaking should pass into the hands of the Corporation. It was ridiculous that a Company should exist with powers to rate to the extent of 2s. in the pound. There ought to be a lower maximum for domestic purposes, and a fixed rate for trade supply. Fixed low rates for water were, in his opinion, necessary for the prosperity of the district. In cross-examination, he said the object of the opposition was not to get the Bill thrown out, but to have it modified. The water-works ought to be equal to the supply of both the

trade and domestic requirements. Since 1889, there had been no direct negotiations whatever on the part of the Corporations for the purchase of the Company's undertaking. Lord Northbourne asked witness why, if the Corporations were anxious to have the water undertaking, they did not bring in a Bill to provide for it. Witness replied: We should like that very much better; but we were forced to oppose this measure. We were afraid that if they got this Bill they would raise the rate. If we do not get a fair and reasonable rate, we cannot induce people to come to the district. Of course, we do not want these people to sell at anything but a reasonable price.

Other witnesses having given evidence in support of the petition of the Corporation, Counsel addressed the Committee.

The Chairman said the Committee had decided to proceed with the Bill. They did not consider it necessary to insert a provision limiting the increase of rates to the existing 1s. 4d. in the pound, nor to prescribe reasonable rates for water used for trade purposes, nor to insert a provision to enable the Corporations of Airdrie and Coatbridge to purchase the undertaking of the Company. With regard to the competition of the Middle Ward Committee, they did not think it necessary to alter the conditions now existing.

Clauses were then adjusted, and the Bill was ordered to be reported.

HOUSE OF COMMONS COMMITTEE.

(*Before Mr.* Schwann, *Chairman, Colonel* Long, *Sir* Cameron Gull, *Mr.* Duckworth, *and Mr.* Bonham Carter, *Referee.*)

GODALMING CORPORATION WATER BILL.

This Bill, which is to enable the Corporation of Godalming to purchase the undertaking of the Frith Hill, Godalming, and Farncombe Water Company Limited, came before the above-named Committee on March 14. It was opposed by the Company, and also by the Guildford and Hambledon District Councils.

Mr. Freeman, Q.C., Mr. Claude Baggallay, Q.C., and Mr. Russell Griffith appeared for the promoters; Mr. Courthope-Munroe represented the Water Company; and Mr. Forbes Lankester attended on behalf of the District Councils.

In opening the case, Mr. Freeman gave the usual particulars as to the powers acquired by the Water Company. He said the total capital consisted of 1500 £10 shares, which, under the Provisional Order of 1878, were entitled to a maximum dividend of 10 per cent.; 2000 £10 "B" shares, which were entitled to 7 per cent.; and the sum of £5500 had been borrowed on mortgage debentures. The capital of £20,000 authorized by the last Order of the Company, obtained in 1897, had not been issued. But the works which were sanctioned by the Order had been carried out, and the money borrowed from the bankers; so that the total amount outstanding against them at the end of 1898 was £11,406. Having enumerated certain works which remained to be executed, Counsel pointed out that for a considerable time the Corporation had felt the necessity of acquiring the undertaking of the Company. For the last four years the subject had been under their consideration; and from time to time they had put themselves into communication with the Company. Though they had a directly hostile petition presented against the Bill, he thought it would turn out that it would be more a question of price than anything else. The Bill was one for the compulsory purchase of the Company's undertaking; and he would ask them to pass it on the ordinary ground that it was a desirable thing, and for the public interest, that an undertaking of the kind should be transferred to the Corporation of an important town. If provision were made for paying a proper price to the shareholders, they could not suffer any possible harm. He would frankly admit that the Company had done their duty as far as they could; and if his friend who represented them could make any suggestion which would settle the matter between them once and for all, without the expense of going to arbitration, he would be pleased. Counsel then proceeded to read the petitions presented by the Company and the District Councils. The latter submitted that if the Bill were allowed to pass, it ought to be only on condition of the insertion of provisions for enabling them, if they thought fit, to acquire any part of the undertaking in their respective districts. They also asked for the fair and equal treatment of the inhabitants and consumers in the outer area with those of the borough; for the application of surplus revenue to the reduction of the water-rates throughout the entire district, instead of to the reduction of the borough rates; for the extension of mains to any places in the outside area where they might deem that a supply was required; and for the charges for water to be on a lower and more equitable basis than that fixed by the Provisional Orders, and now in force. Dealing with these points, Counsel said the Corporation would treat the outside areas exactly as they were treated now; there would be no differential rating. As the Corporation would take the whole risk of any loss, it was only reasonable that they should get the benefit of any surplus. A clause had been inserted by which the petitioners would have power, on giving six months' notice, to acquire any part of the undertaking in their district, and supply their constituents with water, obtained in bulk from the Corporation, so long as it did not interfere with the supply for domestic purposes in the borough.

The only witness called was the Mayor of Godalming (Mr. F. K. W. Girdlestone). In answer to Mr. Baggallay, he said the system of the Water Company was wholly a pumping one; and the water was of good quality. The Company had been extending their mains since the new machinery was provided; and since 1883 they had been paying a dividend of from 3 to 4½ per cent. Since 1892 he had favoured the acquisition of the water supply and lighting undertakings; but the matter did not take definite shape till 1895. On the first occasion, the motion in favour of purchase was carried by a bare majority; but last year there was only one dissentient. The Council were actuated purely by grounds of public policy in their desire to acquire the water undertaking. It was the wish of the Corporation to take over all the statutory powers and obligations of the Company; and in all the debates which had taken place, he had never heard a desire expressed to alter a single provision. There was no desire or power to charge differential rates. Any capital which might be necessary for the works in future would be borrowed upon the water undertaking and the security of the borough rates, and not upon the outside districts, over which they had no rating powers. The borough would take the entire risk.

In cross-examination by Mr. Forbes Lankester, witness said the Corporation were willing to give the outside Local Authorities a clause in the Bill providing that the area beyond the borough should have equal treatment. The outside area within the limits of supply was considerably larger than the area of the borough; and the rateable value was very much higher. He had not heard of any complaints from the outside districts that the Company would not supply them. Wherever there was a likelihood of getting a reasonable amount of custom, the Corporation would be prepared to supply. Asked if it would not be fair to let the outside Authorities have some control in respect of the direction in which mains should be laid, witness said he thought not, seeing that the Corporation would take all the risk. Counsel said he proposed to ask the Committee to declare that the Corporation should not have the powers asked for unless they were prepared to lay down certain definite lines of mains within a reasonable time of getting authority to do so. Witness replied that the Corporation had considered the clauses so hopeless that they declined to have any conference with the District Councils on them. Answering further questions, witness said the Company were limited as to their dividend; but there was no limit in the Bill as to the amount of profit which the Corporation could make and apply to a reduction of rates. It did not seem to him unfair that the profit should not be applied in reduction of the water-rates. That was reasonable to a certain extent; but if the borough was going to take all the risk, it should have a chance of a proportion more profit than the outlying districts. He did not admit that the charges the Company were authorized to levy were higher than would now be granted by Parliament.

In answer to Mr. Courthope-Munroe, witness said he was the original agitator for the purchase by the Corporation of the undertaking of the Water Company, and was one of the signatories to the agreement between the parties as to the terms of purchase. Counsel read the terms of the agreement, by which the Corporation undertook to purchase the waterworks for £51,000, to take over the existing mortgage debentures of £5500, and all existing and future liabilities, and to pay the expenses of winding up the Company, compensation to officers, &c. Witness said he was still prepared to abide by the agreement.

Mr. Courthope-Munroe said he would be willing to let the preamble go, provided the compulsory form of purchase was modified so that, instead of leaving it to arbitration under the Lands Clauses Act, it should be a compulsory purchase upon the terms mentioned in the memorandum he had read. Mr. Freeman said this was an important matter upon which he would desire to consult his clients, because it might shorten the case. Mr. Baggallay remarked that it seemed to him that the preamble was practically done with, and that it was now rather a matter of clauses. Mr. Lankester said he did not object to the outlying districts being taken over by the Corporation, but it should be done on terms which would protect them from injury. Mr. Freeman said he was perfectly willing, if it were necessary, to consent to the insertion of an equity-of-treatment clause.

Replying to further questions, Mr. Girdlestone said the Corporation could not be expected to lay down many miles of main when there was no prospect of water at the other end. If there were any chance of custom, they would be glad to lay mains. They did not want to be bound down by any hard-and-fast rules. The rateable value of the borough was about £45,000, and the assessable value about £38,000. The rateable value of the outside area was about £67,000, but this included a large proportion of agricultural land, which would never be built over.

Counsel for the promoters and the Company having intimated to the Committee that they had practically arrived at an understanding, the Chairman asked Mr. Forbes Lankester if he still maintained his objection to the preamble of the Bill. He replied that he could not assent to its being passed unless he had the clauses he desired. It was decided that the objections should be raised on clauses; and the preamble was passed.

Mr. Forbes Lankester said if the Committee approved of some such clauses as he suggested, the exact wording might be left to a later date. His friend had agreed to the insertion of a clause providing for equality of treatment between the inside and the outside areas; but this did not really meet the whole case of the outside districts, because the powers which the Corporation now sought to take over from the Company were larger than the maximum powers that would be granted by Parliament at the present time. He thought the Referee would tell the Committee that modern Water Bills never contained such large provisions for charging as were to be found in the Order of 1878. What the ratepayers in the borough paid in water-rates they would get back in reduction of their general rates, whereas the outside ratepayers would get no corresponding advantage. It was not unusual to provide that the surplus, instead of going to the rates, should go to the relief of the water consumers themselves; and he asked the Committee to say that, after all reasonable charges had been provided for, the surplus should be applied in reduction of the charges. His next point was that the Corporation, coming now to Parliament for the first time to be made the Water-Supplying Authority, should not be in a better position than if they were coming *de novo* to serve a district which had never before been supplied. His final point was as to the supply to other places. Mr. Girdlestone had said that he did not know of any complaints having been made in the district as to the want of supply; but he (Counsel) submitted, looking at the large area outside the borough, whether there had been complaints or not, the time must be approaching when mains should be laid down. Upon this point he proposed to call witnesses; and he could suggest general lines of development where building was going on, and where the absence of a proper water supply prevented houses from being occupied. He asked the Committee to make it a condition that mains should be laid in the directions he would indicate.

In reference to the last point, the Chairman remarked that he thought the outside districts were well protected. If they pleased, they could cut themselves loose, and supply themselves. In the course of some discussion, the Referee pointed out that the case was already met by Act of Parliament, where a district could call upon a local authority to provide a proper supply. Mr. Freeman said if Mr. Lankester's clients thought the district ought to be served, they had power to do it themselves; and

if the district was badly served, surely there must be sufficient people to compel the Company to supply them.

Mr. Lankester said he thought it would require an exceptional case to induce the Committee to do as he asked; and therefore he did not think it was desirable to press that. But he did most strongly urge the other points—viz., equality of charge, lowering the rates to modern requirements, and the distribution of profits not solely for the benefit of the borough, but of the water consumers generally.

Mr. Freeman, in reply, said the view of all the advisers of the Corporation was that to the outside districts was already absolutely secured equality of treatment; but if the Committee considered there was any doubt about it, they would put in a clause to this effect. He then dealt with the other points of Mr. Lankester's speech.

The Committee having deliberated in private, the Chairman announced that they thought the outside consumers should be protected, and that the clause promised by Mr. Freeman should be inserted. As to profit, should there be a surplus, it should go in reduction of the water-rates throughout the whole district. As to the laying of mains, they did not think the Corporation should be tied down by any restrictions. But they certainly thought the rates fixed by the Provisional Order of 1878 were rather too high; and they recommended the Corporation to consider and agree to some reduction on what had been usually fixed by the Company. They expressed the opinion that the Corporation should bring up a clause more in harmony with modern methods; and that some limit should be fixed to the charges that could be made. They ought to take the rateable value and not the rack-rent as the basis.

When the Committee assembled on the following Tuesday to consider the clauses they had asked to be prepared, they were addressed by Mr. F. F. Daldy, who appeared on behalf of a number of shareholders in the Company who objected to the acceptance of the agreement come to between the Corporation and the Company, which they asserted was void. Counsel said he did not attempt to argue the case, or to oppose the Bill; but the agreement has been used as an inducement to the Committee to sanction the purchase of the water-works for £51,000, when there was an express undertaking on the part of the Directors not to make use of the document. Mr. Baggallay said he had nothing to do with any proceedings between the Directors and the shareholders of the Company. He reviewed the circumstances which led up to the understanding come to that the terms mentioned—viz., £51,000—should be made binding upon the Corporation, and said the question was really between Mr. Munroe and Mr. Daldy, who had attended to represent some dissentient shareholders, who might have petitioned against the Bill. The Chairman asked if Mr. Daldy wished the Committee to reject the Bill, or to make the price a matter for arbitration. Mr. Daldy said he would rather leave that to the Committee. Most of the dissentient shareholders did not object to the Bill *in toto;* but they were not disposed to agree to £51,000 as the price of the undertaking. Mr. Courthope Munroe, replying on behalf of the Company, said the whole question had originated in a mare's nest. The document referred to was binding on the Corporation, but it was waste paper so far as the Company were concerned until it had been assented to by three-fourths of the shareholders; and this had not yet been done. Mr. Baggallay explained to the Committee the attitude of the Corporation on the matter. The Corporation felt they were bound in honour to stand by what they had told the Directors, who, they knew, were representing the great majority of the shareholders, although it might not be a statutory majority. The Corporation came to Parliament for compulsory purchase. The dissentient shareholders knew all along what was being done. It was open to them to have come before the Committee, through Mr. Daldy, to watch the proceedings. They could have presented a petition, and called attention to anything they thought injurious to their interests; but they did not. After some further remarks, the Committee deliberated on the matter, and decided that, as no petition had been presented on behalf of the dissentient shareholders, they had no *locus standi* before them.

The clauses were then considered. The first taken was the one embodying the decision of the Committee that any surplus profits should go in reduction of the water-rate throughout the whole district. Mr. Freeman pointed out that the decision involved very serious responsibility for the promoters; and he said he was bringing up a clause dealing with this matter. He then read the clause, as follows:—

And any balance remaining in any year shall, so long as the Corporation charge, under the authority of this Act, any owner or occupier of a dwelling-house, or part of a dwelling-house, a rate for the supply of water for domestic purposes exceeding 4 per cent. per annum on the rateable value, be applied in reduction of the water-rates; and any balance remaining in any year, after such reduction of the water-rates to a charge not in any case exceeding 4 per cent. per annum on the rateable value, shall be carried to the credit of the district fund.

Counsel pointed out that if the Committee's decision were carried into effect absolutely, without any deviation, the Corporation would have to find an additional rate for a great number of years, without any possibility of ever recouping themselves. The Mayor (Mr. F. K. W. Girdlestone) was called in support of this statement, and his calculations showed that the annual payments on account of the water undertaking would come to £3404; whereas the Water Company's profits for 1898 were only £2336—leaving a deficiency to the extent of £1068, which meant a rate of 7½d. in the pound for water alone on top of a rate last year of 8s. 2d. This would make 8s. 9½d. in the pound, which the borough would be quite incapable of bearing without a reasonable prospect, in accordance with all parliamentary precedents, that in the course of years they would be allowed to make a moderate profit, after the water rate had been reduced to a moderate sum. Witness acknowledged, in answer to Mr. Lankester, that the clause was a compromise. He added, in reply to the Chairman, that if the Committee's arrangement were enforced, the Corporation would probably withdraw the Bill, as he could not advise them to take the risk. At this point some conversation took place between the members of the Corporation in the room; and all expressed the opinion that the Corporation would have to abandon the Bill if the decision of the Committee as to the profits were incorporated. After conferring in private, the Chairman announced that the Committee could not accept the clause proposed by the Corporation. They would, however, be glad to hear any remarks against the clause proposed by the other side. Mr. Freeman replied that he had nothing further to say. The following clause was prepared by Mr. Lankester, and accepted by the Committee:—

And any balance remaining in any year shall from time to time be applied in reduction of the water rents and charges when and as circumstances shall permit the same to be done; but the Corporation may retain in hand at the close of any financial year so much of the surplus as they shall think necessary for the purpose of carrying on the undertaking and paying the current expenses connected therewith.

After some discussion, the other clauses were agreed to; and the Committee ordered the Bill to be reported for third reading.

With reference to the decision recorded above, the Town Council have passed resolutions in which they (1) declare their intention not to accept a Bill authorizing the purchase of the water undertaking unless it contains a clause providing that ultimate profits from the undertaking shall be applied in reduction of the general district rate, and (2) agree to contest in the House of Lords the clause inserted by the Committee of the House of Commons to the effect that such profit shall be applied in reduction of the water-rate throughout the whole of the Company's area of supply.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Saturday, April 15.

(*Before Mr. Justice* BYRNE.)

The Incandescent Gaslight Company, Limited, v. The Daylight Incandescent Mantle Company, Limited.

This case was heard by his Lordship early last month (see *ante*, p. 664), and extended over three days; judgment being deferred.

Justice BYRNE, in giving his decision to-day, said the issue was one of infringement only. The patent which was alleged to be infringed had been very fully expounded in the two judgments of Mr. Justice Wills, in the De Mare and Sunlight cases, and in the judgment of the Court of Appeal in the former case; and he did not think it necessary to again go over the ground covered by these judgments, except so far as might be required to explain the present decision. In the De Mare case, after a close examination of the construction and scope of the specification, having regard to the knowledge of chemists at its date, Mr. Justice Wills said the patentee claimed, not the prescription, apart from the rest of the process, nor the construction of the skeleton or *simulacrum* of the vegetable fabric in any oxides which would give durable incandescence (for such a claim would vitiate the patent), but a combination of the various essential elements in the process described. This process was the manufacture of the hood out of the substances mentioned, which he had ascertained would answer, by means of the impregnation, with blends of certain salts and in the proportions indicated, including, of course, such variations in proportions and strength of solution as were fairly within the specification as it would be understood by a competent workman, and brought into a condition for everyday use by being put into a burner and having its carbon filaments or threads burned out, so that the anhydrous oxides were left in the precise shape which the fabric had originally. If the process which the defendants held out that they were going to use was substantially identical with this process, they were liable. Then with regard to the real substance of the invention, and the test to be applied in ascertaining whether or not there had been an infringement, he might refer to one other passage in Mr. Justice Wills's judgment, in which he said that Welsbach certainly discovered for the first time a method by which a skeleton of the durable and resistant earthy oxides mentioned by him could be obtained, which would give practically a means of furnishing an incandescent light surpassing the best-known methods of obtaining illumination from gas. His specification claimed the whole process by which he arrived at this result. The defendants took out of it the impregnation of the fabric by blends of salts of zirconium and the rare earths, and the reduction of these to anhydrous oxides, forming a *simulacrum* of the fabric. He was satisfied, on the evidence, that it was this mode of getting the blends of the oxides into the shape of the fabric of which the hood was composed that had made the process of any use; and that a mere variation of the prescription, extending even to the omission of the lanthanum, was of trifling consequence in comparison. He need not go at length through the specification, bearing in mind what had already been determined as to the construction to be put upon it, but would only read the prescription of the materials to be employed, and the proportions named. Having done so, his Lordship went on to say that cerite earth contained—beside small traces of other matters, which for the present purpose might be disregarded—lanthanum, didymium (now known, though at the date of the specification at the most suspected, to be itself a compound of rare earths), and cerium. It had been decided in the De Mare case that, notwithstanding the prominent place occupied in the alternative prescription by the oxide of lanthanum, there might be an infringement of the patent although that oxide was altogether omitted by the infringer; and passing by for the moment a point in reference to the method of application of cerium, he had first to consider whether or not the defendants, who admittedly used a very small amount of cerium, together with zirconium and certain other immaterial matters, were making use of the plaintiffs' prescription. On behalf of the defendants, it was said that the reference to cerium in the Welsbach specification was really a warning against its use; and the main contest had turned on the true meaning of the sentence: "Instead of oxide of lanthanum, cerite earth containing no didymium and but little cerium may be employed." It appeared that at the date of the specification the true value of cerium as assisting illumination was not fully understood. But more recent discovery had shown that it was most valuable for the purpose; and the defendants said that, though the inventor told the world that only a little cerium might be used with lanthanum, he only did so incidentally, in a sentence designed to warn people against the use of this substance, and that it would be better if it were got rid of altogether. He did not think this was the fair reading of the specification. The claim was in terms for "the manufacture, substantially as herein

described, of an illuminant appliance for gas and other burners, consisting of a cap or hood made of a fabric impregnated with the substances mentioned, and treated as set forth." Now the substances mentioned as one alternative prescription were zirconium and cerite earth, deprived altogether of didymium, and of all but a little cerium. If the inventor had meant that cerite earth deprived altogether of cerium would be better than the same earth containing but a little of the substance, it would have been most easy and most natural for him to say so. If he had rightly apprehended the evidence, to have prescribed cerite earth containing no didymium and no cerium would have been to say that, instead of using oxide of lanthanum, one might use cerite earth deprived of everything material except oxide of lanthanum. It was quite clear, however, that the inventor knew at least that the presence of a little cerium would do no harm, though much cerium would be injurious; and he thought his meaning was that instead of pure lanthanum a mixture of lanthanum and cerium might be employed. His warning was against much cerium; his prescription was no didymium and a little cerium. The defendants got rid of oxide of lanthanum altogether; but this would not serve them. They used a little—a very little—cerium, and relied upon it mainly for their illumination. But apart from minute verbal criticism, in substance, the inventor said: "Instead of oxide of lanthanum, you may use cerite earth deprived of the whole of the didymium, and of all but a little cerium." It was further argued that the inventor said that the proportions in which the substances were compounded might be varied within certain limits, and that these variations must be intended for limits within which the defendants did not come, inasmuch as they used only ½ per cent. of cerium—with over 90 per cent. of zirconium and no lanthanum. The range of limits given in the prescriptions themselves was very wide; and having regard to the fact that the proportion of cerium was obviously intended to be very small indeed, as compared with the other constituents, he did not think this suggestion could prevail. So far, the defendants failed in their contention; but he had now to consider a different matter altogether—viz., the method in which the cerium was applied. The patentee contemplated the saturation of the fabric with the solutions of the salts; the defendants applied the cerium by painting only, without previously using any solution containing that substance. But on the question of the construction of the specification, the defendants had failed to satisfy him that they were right. The Sunlight case was absolutely distinguishable on this point. The defendant in that action did not make use of one of the rare earths as the source of their main illuminating power; they employed chromium—not a rare earth, and not referred to in the specification. On the evidence, he did not think there was any such distinction to be drawn with reference to the method of application of the rare earth cerium to the zirconium mantle as entitled the defendants to say that they had not substantially taken the Welsbach process and produced the same result. There was a difference of opinion between Professor Dewar and Mr. Ballantyne on the one hand, and Sir William Crookes on the other, on the question whether or not the same result was obtained by introducing the cerium in the collodion coating on to the zirconium mantle, as done by the defendants, instead of introducing it with the zirconium and lanthanum into the aqueous solution in which the fabric was dipped, as suggested in the Welsbach patent. Sir William Crookes found an improved result with respect to illuminating power if it were introduced as the defendants did; Professor Dewar and Mr. Ballantyne said their experts showed that it made no difference. He thought the result of the evidence was that in whichever way the cerium was applied the permeation of the whole substance of the mantle was obtained, although the result was more certainly equal when Welsbach's method was employed. It was true that in the Sunlight case Mr. Justice Wills referred to the different method of applying the chromium as one of the points going to show that in that case there was no infringement; but he pointed out that none of the rare earths was used, and he (Justice Byrne) did not gather that if the defendants in that action had employed one of the rare earths instead of chromium, the learned Judge would have come to the conclusion he did. In the present case, the evidence satisfied him that the defendants did use a process or method of applying an illuminant—cerium, a rare earth—so as to effect substantially the same permeation of the mantle as was effected by the Welsbach process. On the whole case, therefore, the plaintiffs were entitled to succeed.

Mr. Terrell asked for judgment against the defendant Company and the defendant Arthur Hill, an inquiry as to damages, and costs as between solicitor and client.

Mr. Graham submitted that his Lordship should not in this action give the costs as between solicitor and client, and cited several cases in which such an order had been refused.

Mr. Bousfield added a few words to the same effect; pointing out that the defendants had not contested the validity of the patent.

Justice Byrne said he saw no sufficient reason to depart from the ordinary rule. He should not direct that the costs should not be as between solicitor and client.

A further question arose as to whether an order should be taken against two other defendants—Messrs. Grantoff and Dann.

Mr. Terrell admitted that he could take no order against the first, as he had not been served, but asked for an order for costs against Dann.

Mr. Bousfield said Mr. Dann had been served just before the trial; but no statement of claim had been served upon him. Though he was willing to abide by the injunction, he submitted that no order could be made against Mr. Dann for costs or damages.

After some discussion,

Mr. Terrell said he would ask no relief against Mr. Dann in this action; the plaintiffs could proceed against him separately. He then asked for an order for the delivery up of all infringing mantles.

Mr. Bousfield did not resist this; but he asked for an undertaking that they should not be destroyed for a certain time, pending a possible appeal.

Justice Byrne suggested that the plaintiffs should undertake to retain them for a month.

Mr. Terrell said this should be done. There was another question, however. He understood that some of these mantles were in the hands of the liquidator of the defendant Company.

Mr. Bousfield remarked that he knew nothing about that.

Justice Byrne said he could only make the order against the defendants in the action, their servants, and agents.

The Appeal in the Hull Gasholder Case.

The further arguments in the appeal in the case of *Jordeson v. Sutton, Southcoates, and Drypool Gas Company* (see *ante*, p. 807) were resumed last Wednesday before the Master of the Rolls and Lords Justices Rigby and Vaughan Williams, and concluded the following day. Mr. Upjohn, for the respondent (Mr. Jordeson), read numerous passages from the evidence, with the view of showing that the appellants had not only pumped water, but had removed soil, in the shape of silt, from beneath the plaintiff's land, and were thereby liable for the damage occasioned, even if he were not right in contending that the pumping of water, if it caused damage, was an actionable wrong. Mr. Deighton Pollock added a few words with the view of emphasizing one of the points urged by Mr. Upjohn, that, the damage being admitted, the burden of proof lay on the defendants to show that their action had not caused it, and that this onus had not been discharged, the defendants not having called witnesses who actually did the work or saw it continuously when in progress. Mr. Haldane, in reply, cited other passages of the evidence to support his contention that substantially nothing but water had been removed. In conclusion, he added a few remarks on the legal point, that the operations of the Company were justified by their Acts of Parliament. Their Lordships intimated that they would give judgment very shortly.

Gas-Fitters and Gas Explosions—An Important Decision.

Sitting at the Cardiff County Court last Thursday, his Honour Judge Owen heard an action in which James Jones, a fish dealer, sought to recover damages for personal injuries from William John, a builder. Mr. J. Sankey appeared for the plaintiff, and Mr. George David represented the defendant. In opening the case, Mr. Sankey said the plaintiff took a shop in Railway Street, at which there had been a fire, in consequence of which the gas-pipes needed repairing. The work was done by the defendant; and on Dec. 16 the defendant's son, Oliver John, said the pipes were all right. Half an hour after he had left the premises, a smell of gas arose; and a painter named Farley took a lighted candle upstairs. He forced up a floor-board, and just as plaintiff followed into the room put down the candle, exclaiming, "Here it is." Immediately an explosion took place, and plaintiff was blown to the ceiling and badly hurt, so much so that an operation had to be performed on him. Farley escaped unhurt. The plaintiff, Dr. Phillips, and other witnesses gave evidence bearing out the opening statement—the doctor adding that the plaintiff was not yet fit to carry on any occupation. Defendant was called, and said that the gas-fitting was done by a qualified man. The painter Farley said he went out of kindness to look for a leak when plaintiff complained of an escape. He found the place and put the candle down, and that was all he remembered. It was not his work to bother with the gas. The gas-fitter stated that, when he finished the pipes, the meter had not been connected, so that he could not test for leakages. Oliver John, the defendant's son, said he was told to meet the plumber; but when the latter did not turn up, he put the caps on himself. His Honour held that plaintiff was entitled to recover. The defendant contracted to carry out the work, and then employed another man to do the gas-fitting. It was a very serious accident, with a sad result; and he did not think the claim was too much. He gave judgment for the £50 claimed, with costs.

Winding Up of the Acetylene Gas-Light, Power, and Calcium Carbide Company, Limited.

A petition presented by J. Barker and Co., Limited, for the compulsory winding up this Company came before Mr. Justice Wright last Wednesday. The concern is at present in course of voluntary liquidation; but the petitioners, who are creditors for £162, preferred that the winding up should be continued under the supervision of the Court. Various creditors appeared and supported the application; and the voluntary Liquidator not objecting, his Lordship directed that the winding up should be continued as desired by the petitioners.

Morecambe District Council and the Gas-Works.—The Morecambe District Council last Wednesday decided to convene a public meeting to consider the advisability of promoting a Bill in the next session of Parliament for the purchase of the Gas Company's undertaking.

Alleged Nuisance from the Cardiff Gas-Works.—At last Tuesday's meeting of the Cardiff Corporation Health Committee, some discussion took place as to certain complaints made by residents of Grangetown that a nuisance was caused by the local gas-works. The Medical Officer reported that he had communicated with Mr. H. Morley (the Gas Manager), who stated that he would see that every precautionary measure was adopted to abate the bad smells incidental to gas manufacture, and pointing out that there was no injurious and no worse smell now than had been the case for the past 30 years. In reply to certain members, the Medical Officer explained that the nuisance was mainly caused by sulphuretted hydrogen evolved by the lime after it had been utilized for purification. On the question of whether a conviction would follow if a summons were issued, he gave extracts from a Local Government Board report issued recently, which was to the effect that while nuisances generally arose from gas-works, the Chief Medical Officer of the Local Government Board had then reported that there was no necessity for the continuance of injurious smells in the manufacture of gas. Mr. Mildon then called attention to the smoke nuisance from the works, and to a complaint that "the vapour was not only evil smelling, but probably seriously injurious to health." He said there were houses within a couple of hundred yards of the works; and he had seen a practical illustration of the effects of the vapour, which in his opinion would be considerably minimized if the Committee insisted upon the raising of the Gas Company's chimney stacks. Eventually a Committee was appointed to visit the works and neighbourhood in company with the Medical Officer and the Borough Engineer, so as to see what could be done to remedy the complaints.

MISCELLANEOUS NEWS.

AN IMPORTANT COAL COMBINATION IN LANCASHIRE.

Probable Advance in the Price of Gas Coal.

Our Lancashire correspondent writes: The efforts to establish some effective combination of the colliery-owners throughout the Lancashire district, and also to secure the co-operation of neighbouring coal-raising districts, with the object of strengthening the position generally as regards prices for the ensuing season's gas-coal contracts, to which reference was made some time back in my weekly reports, have now taken definite shape. A Lancashire Gas Coal Sales Association has been formed, and a meeting was held last week in Wigan to arrange the necessary details of the organization. Its special object will be to regulate prices at which tenders are to be sent in for the various gas-coal contracts; and, in the meantime, information is being carefully collected as to the quantity of gas coal that will be offered on contract from Lancashire for the ensuing season, with the probable quantities that gas companies and corporations will require. Such an estimate can, of course, only be approximate. But, from the figures so far collected, it is anticipated that in Lancashire the quantities of gas coal which collieries will have to offer will exceed those of last year by about 50,000 tons; while the bulk that will be required by gas manufacturers will, it is expected, be 170,000 tons more than last year. As, however, the quantities then offered were considerably greater than the demand, the increased needs of the present year will probably not much more than level matters; but it is anticipated that the requirements for gas making will be slightly in excess of the supplies which coalowners will have to offer. Under these conditions the latter do not anticipate any difficulty in holding out for a substantial advance over last year's figures. The general basis of this advance is to be 1s. 6d. per ton over the contract prices of last year; but in some instances, where exceptionally low rates were taken, it is not improbable that an advance of 2s. may be quoted. An important understanding has also been come to between the Lancashire Association and the Yorkshire coalowners, which will materially limit the competition for the gas-coal contracts. It has been arranged that, with regard to some half-dozen important Lancashire towns where Yorkshire gas coal has hitherto been sent in, competition with Lancashire coal, Yorkshire owners shall not this year offer at all; and a similar mutual understanding has been come to on the part of the Lancashire Association with the Yorkshire firms. It will thus be seen that everything points to an absence of the extreme keenness of competition for the ensuing contracts, which in previous years has so much tended to cut down the contract prices; and that there will be a very substantial advance over last year's rates for the ensuing season's supplies is absolutely certain. So far, no important business has been put through in gas coal to really test the position; but where gas companies or corporations have required extra quantities beyond their contract deliveries, to carry them on until the new contracts are placed, they have, in most cases, had to pay an advance of 1s. 6d. to 1s. 10d. per ton over the 1898 prices.

THE BOARD OF TRADE REPORT ON THE GAS AND WATER BILLS AND ORDERS OF THE PRESENT SESSION.

The Board of Trade report on the applications for Gas, Electric Lighting, and Water Bills and Provisional Orders for the present session was issued last Wednesday. It shows that the number of Bills relating to the supply of gas is 31, of which 28 are for England and Wales and 3 for Scotland. There is one Bill relating to Ireland—the Belfast Corporation Bill—which is, among other things, to authorize an expenditure of £200,000 on the gas undertaking; but for the purposes of the report it is classed among the Tramway Bills. The capital proposed to be raised is £6,453,582—£1,849,000 by shares, and £4,604,582 by loans; the latter amount including £235,000 proposed to be authorized for gas expenditure by Bills classed among Tramway Bills. There are 58 Bills relating to the supply of water; five being for Scotland, one for Ireland, and the rest for England and Wales. The total capital asked for is £38,283,167—£2,369,700 by shares, and £35,913,467 by loans. The latter amount includes £40,000 proposed to be authorized by Bills classed among Gas Bills. Provisional Orders to the number of 20 have been applied for in respect of gas and water supply; and 109 in regard to electric lighting schemes. The capital proposed to be raised under these Orders is: Gas and water, £519,166; electric lighting, £3,994,301. Compared with last year, the number of Gas Bills is decreased by 3; that of Water Bills is increased by 11. The capital required for gas purposes is £1,721,240 more, and that for water purposes £33,037,124 more than last year. For Gas and Water Orders, the capital proposed is £142,729 more, and for Electric Lighting Orders £1,845,631 more than in 1898. Applications for the last-named Orders show an increase of 25, as compared with an increase of 29 last year. In addition to the Electric Lighting Orders, there are nine Bills relating to England and Wales; but in only four cases is the proposed capital stated. The total is £6,125,000.

THE MANAGEMENT OF THE LONGTON GAS-WORKS.

Resignation of Mr. W. S. M'Gregor.

At the last Monthly Meeting of the Longton Town Council, the subject of the management of the gas-works was under discussion. It arose on the minutes of the Gas Committee, in presenting which Alderman Bakewell referred to a matter which had occurred at the last meeting of the Committee. According to the report in a local paper, he explained that they had gas-sheets laid before them each month, showing the quantity of gas made and sent out, the coal used, the gas made per ton, and the cost of the coal per 1000 cubic feet of gas. At the March meeting, they always made their estimate of the profit on the gas-works for the current year, in order that the Chairman of the Finance Committee might include it in his estimates. In getting out from the books some particulars for the yearly estimate, he was so disappointed with the results, compared with his anticipations, that he had the sheets tested, and found that up to the present date there had been a considerable quantity of gas—something like 5 per cent., or 7 million cubic feet—put down which had not been made, and that something like 1000 tons of coal had been used, but had not been put down. Of course, the result was that their gas-sheets were made utterly fallacious. The first question that arose was whether the discrepancy was intentional or simply the result of carelessness. The Manager (Mr. W. S. M'Gregor) admitted that he had never tested the returns, and had no knowledge of the matter; but at the same time he acknowledged that he ought to have tested them. He (Alderman Bakewell) had tried to find out how the errors arose, but had not been successful. The sheets seemed to have been almost guesswork. The remedy he suggested was to have a head clerk, who should be responsible to the Gas Committee. Then he had no doubt they would make further reforms. Although this matter undoubtedly reflected on the Manager's supervision of the office, he thought it ought to be understood that Mr. M'Gregor had altered the system of bookkeeping undoubtedly to the very great advantage of the town. The whole matter would be taken into consideration at a special meeting of the Gas Committee on the following Tuesday. Alderman Leak, although not wishing to make things worse than they were, said that existing circumstances did not warrant the Council shutting their eyes to the very serious state of affairs. For months they had repeatedly had before them the failings of the gas management; and if the Committee were not going to tackle the subject thoroughly, it was time the Council took it up. Mr. J. Preece said the matter ought to have been found out before. The Committee had been told that things were going wrong; but they had acted on the supposition that they were all right. He moved that, as the matter was so serious, the affairs of the gas-works should be considered by the Council in General Purposes Committee. Only three members, however, voted for the amendment, and many against it. Alderman Bakewell replied, and the minutes were eventually confirmed.

We have since learnt that the Gas Committee have decided upon submitting to the Council several important recommendations; and that Mr. M'Gregor has sent in his resignation as Manager and Secretary, which offices will, in future, be separated.

METROPOLIS GAS SUPPLY.

Dr. A. W. Williamson's Quarterly Report.

The following is an extract from the report of Dr. A. W. Williamson, F.R.S., the Chief Gas Examiner for the Metropolis, on the quality of the gas supplied to London during the quarter ended March 31.

The average illuminating power in standard sperm candles and the average amount of sulphur present in the gas at each of the testing-places were as follows:—

	Illum. Power.	Sulphur.
The Gaslight and Coke Company—		
Fenchurch Street, E.C.	16·5	12·7
Kinghorn Street, Cloth Fair, E.C.	16·5	11·1
Dorset Buildings, E.C.	16·6	10·7
Millbank Street, S.W.	16·5	8·7
Ladbroke Grove, W.	16·4	12·5
Vincent Terrace, N.	16·4	12·9
Carlyle Square, Chelsea	16·2	10·9
Camden Street, N.W.	16·2	12·6
Graham Road, Dalston	16·7	10·7
Kingsland Road, E.	16·5	12·7
Spring Gardens, Charing Cross	16·2	11·4
Vinery Villas, St. John's Wood	16·1	14·3
Lambeth Road, S.E.	16·1	10·7
Hornsey Road, N.	16·3	10·5
George Street, Hampstead	16·6	14·0
Commercial Gas Company—		
Parnell Road, Old Ford	16·2	7·8
South Metropolitan Gas Company—		
Hill Street, Peckham	16·8	10·7
Bedford Road, Clapham	16·3	12·7
Stoney Lane, Tooley Street	16·7	14·9
Lewisham Road, S.E.	16·3	11·4
Blackfriars Road, S.E.	16·5	12·3
Burrage Road, S.E.	16·4	12·8

It will be seen from these results that the average illuminating power of the gas at all the testing-stations was higher than the parliamentary standard of 16 candles. Sulphuretted hydrogen has not been reported as being present in the gas during the quarter at any of the stations. The average amount of sulphur in other forms than this was considerably less at all the stations than the quantity permitted; and the maximum amount was within the limit allowed, with the exception of two occasions at the Fenchurch Street station. Ammonia was generally present in the gas throughout the quarter, but only in slight quantities. The amount allowed was not exceeded on any occasion.

THE WORK OF THE PUBLIC HEALTH DEPARTMENT OF THE CORPORATION OF LONDON IN THE PAST YEAR.

The report of the Engineer of the Public Health Department of the Corporation of London (Mr. D. J. Ross), on the works executed during the past year, has just been issued. It contains, as usual, particulars in regard to the lighting of the City streets by gas and electricity, and the use of water for sanitary purposes, &c.

The charge for gas is 2s. 3d. per 1000 cubic feet; and the number of lighting hours is 4300. The annual cost works out as follows: For lamps burning 4 cubic feet per hour (incandescent), £1 18s. 8d.; 5 cubic feet, £2 8s. 4d.; 6 cubic feet, £2 18s.; 8 cubic feet, £3 17s. 5d.; 10 cubic feet, £4 16s. 9d.; 15 cubic feet, £7 5s. 1d.; 20 cubic feet, £9 13s. 6d.; 25 cubic feet, £12 1s. 10d.; and 50 cubic feet, £24 3s. 9d. There are no charges for lighting and repairing the incandescent lamps; but in the case of the square lanterns there is an extra charge of 18s., and in that

of the circular lanterns of 22s. 3d. up to 20-feet consumption. For the 25 and 50 feet lamps, 30s. per annum is charged for lighting. The number of defective gas lights observed during the year was 108. Returns as to these are made daily by the police, and include only those lamps in which defective lighting is very noticeable. The number of gas-lamps now paid for by the Corporation is 1900; more than one-third having been removed in consequence of the main thoroughfares being lighted by electric lamps. The 36 meters attached to the public lamps in various parts of the City show that the full contract quantity of gas is given at these lamps. The Inspector of Gas Lighting is of opinion that the stipulated quantity is furnished generally throughout the City, and that the regulators of the lamps are kept in proper condition. The public lamps, both gas and electric, were lighted, in accordance with general instructions in force for many years past, whenever fog or unusual darkness occurred. This happened on nine days. The experimental lighting in Wood Street with Welsbach incandescent gas-lamps, and in Great St. Helen's with the same system, and also with Denayrouze incandescent burners, was continued throughout the year. Since the 14th of November, Basinghall Street has been lighted experimentally with the Sunlight Company's new incandescent gas-burners and lanterns; the trial being conducted at the expense of the Company. The lighting of the main thoroughfares of the City with arc lights was continued throughout the year; the number in use at the close being 502. The question of employing electricity for lighting the side streets is still under consideration. The number of defective electric lamps observed during the year was 886. As in the case of the gas-lamps, returns are made daily by the police; and the Electric Light Company are fined for each failure.

As in previous reports, information is furnished with regard to the extent to which the subways for gas, water, and other pipes beneath the City streets are used. There are now about 2392 yards, or 1⅓ miles, of these subways; and nearly 10½ miles of gas, water, and hydraulic mains, telegraph and pneumatic tubes, and electric lighting conduits, are laid in them. The electric light and telegraph conduits contain about 440 miles of wires and cables. Mr. Ross states that the usefulness of the subways is evidenced by the fact that in the streets beneath which they have been constructed no openings have been made for access to pipes, &c., except those for taking pipes into the ends of the subways, since they were first made. Access, under proper supervision, is given to the officers and workmen of the various companies concerned. The Inspector of Subways reports that 6294 workmen and others were admitted during the past year for various purposes. The Streets Committee have had under consideration the question of making a charge for the use of the subways, on the same principle as the London County Council. But at present, the gas, water, telegraph, and other authorities have the free use of them.

The water used for flushing sewers, watering streets, and other purposes cost £3736 last year, as compared with £3786 in 1897. In the washing of streets and courts 26,664,882 gallons were employed. The artesian well sunk by the Corporation in the neighbourhood of Hounsditch gave an ample supply of water last year to the artisans' dwellings in Petticoat Square; and the Engineer states that during the long-continued drought which prevailed towards the close of the summer the surplus water was supplied to the Whitechapel Board of Works without charge.

THE INSPECTION OF GAS AND METERS IN MASSACHUSETTS.

We have received the annual report of the Inspector of Gas and Meters in Massachusetts (Mr. Charles D. Jenkins). It is a record of his work for the year ending Dec. 31, 1898; and we learn therefrom that there were 649 tests of gas made, 23,131 gas-meters inspected, 10 meter-provers graduated, and several special examinations of gases conducted to ascertain their heating value and composition.

Mr. Jenkins states that, as usual, complaints were received of large gas bills, which were unaccountable to the consumers; and he remarks, as others have done on this side of the Atlantic, that in such cases a little time devoted to reading the meter and looking after the burners might satisfy the complainers. He thinks it ought to be a common acquirement to read a gas-meter; and for this purpose he advises that meters should be set up in light, easily accessible places, and not higher than 6 feet. Locating meters near the ceiling of warm halls or rooms is not only bad for them, but renders it difficult to read them or to shut off the gas in an emergency. Mr. Jenkins accompanies his remarks with a few useful hints on the subject of reading meters and testing for leakages. He says it is a most satisfactory method of checking the quantity of gas used to read the meter at regular intervals (say, daily or weekly); thus keeping track of the rate at which the gas is being used and registered. He goes on to point out that many gas-burners require careful treatment in order to prevent a large and unnecessary loss of gas. He records the particulars of a test which gave an illuminating power of 21·3 candles when burning 5 cubic feet of gas per hour, and 20·8 candles when burning 12·3 cubic feet. This change was made by simply opening the stopcock wider, and allowing the gas to blow. Open-flame burners should show a smooth flame, without "fingers" (visible streams of gas in the body of the flame) or "ears" (thin, pointed flames shooting out from corners of the flame). The remedy for these wasteful methods of burning is to shut down the gas supply at the stopcock, or to use a good governor or check burner.

In the report for the year 1897, the number of gas companies dealt with by Mr. Jenkins was 68. Since that report was made, one more—the Framingham Gas, Fuel, and Power Company—has been added. These 69 companies had the gas supplied by them tested at irregular intervals during the year—no notice whatever being given of an intended visit. The number of inspections depends on the quantity of gas supplied, each company having two inspections yearly, and an additional one for each 6 million feet of gas sent out, until the inspections become weekly. The average illuminating power of the gas supplied by the 36 coal-gas companies last year was 18·43 candles, as compared with 17·92 candles in 1897; that supplied by the 17 water-gas companies, 23·72 candles, against 23·66 candles; that sent out by the mixed coal and water gas companies, 20·21 candles, against 19·79 candles; and that of the 7 companies supplying petroleum gas, 38·02 candles, against 38·11 candles. The average quantity of sulphur found in the gas of all the companies except those supplying oil gas was 9·61 grains per 100 cubic feet, as compared with 9·54 grains in 1897; the ammonia averaging 2·06 grains, against 2·29 grains. The gases of four companies were tested for their heating power by means of the Junkers calorimeter; and the results are given in the following table:—

Company.	Net B.T.U. from Calorimeter.	B.T.U. from Condensation.	Gross Experimental B.T.U.	B.T.U. as Cal ulated from Analyses
Arlington . .	645·5	59·5	706·0	707·1
Boston . . .	665·8	41·5	707·3	708·4
Ipswich . .	639·0	59·0	698·0	691·4
Marblehead .	612·8	58 2	671·0	674·2

The Arlington gas was a coal gas, with 10 per cent. cannel enricher; and the Boston gas was a water gas, as supplied to the Inspector's office. The next two samples are interesting in comparison. The Marblehead gas was made from coal, with no enricher, at a low heat, the yield being about 4 cubic feet per pound. The marsh gas was high, and the nitrogen and carbonic acid low; while the illuminants were rich and of good light and heat giving qualities. The Ipswich gas, containing more than four times the amount of illuminants, gave 38·7 per cent. more light, and only 4·3 per cent. more heat. Mr. Jenkins says this shows that candle powers and specific gravities cannot be used from which to figure the relative heating values of gases. It is to be noticed that the heating value of gas, as usually given, figured from the analyses, is for dry gas at 32° Fahr. and 29·92 inches barometer, and is approximately 100 units higher than the "net" results.

With regard to meters, of the 23,131 tested, 22,594 were either new or had just been repaired; and they were generally found to register correctly—a very small number being returned for adjustment. Mr. Jenkins points out that, in testing meters, the very important question of temperatures must be kept prominently in mind. It is not sufficient to take a meter into a testing-room, and, connecting it with a prover, to run it without further precautions. A difference of 5° Fahr. in any of the conditions of testing will be likely to make an error of 1 per cent. in the proof of the meter. The meter should be kept in the room long enough—say, 10 to 20 hours—to ensure its acquiring the room temperature. In order to make a satisfactory test, the temperatures of the air in the room and the air and water in the prover as well as of the meter should agree within 2°. The remaining 537 meters belonged to the class of "complaints," comprising meters suspected of being inaccurate by the consumer or the gas company. These meters are re-inspected by the State Inspector on complaint being made by either party. The results do not show much difference from those of former years. One meter would neither pass gas nor register; while eleven would pass gas, but would not register. Of the remaining 525 meters, the average error was 1·10 per cent. fast. There were 235 meters—43·76 per cent. of the total number—fast, the average error being 4·97 per cent.; and 42 were slow, the average error being 15·65 per cent. Of the fast meters, 167 were less than 5 per cent., 58 were between 5 and 10 per cent., 9 between 10 and 15 per cent., and 1 between 15 and 20 per cent. fast. Of the slow meters, 14 were less than 5 per cent., 16 were between 5 and 10 per cent., 6 between 10 and 15 per cent., and 2 between 15 and 20 per cent. slow; and there were one each 20, 38, 145, and 190 per cent. slow. There were 248 meters correct within the legal limits.

ELECTRIC LIGHTING NOTES.

The Oswestry Town Council have engaged a valuer to report upon the undertaking of the local Electric Lighting and Power Company with a view to acquiring it.

The Ashton Town Council were informed by the Electricity Committee last Wednesday that, at the end of last month, the total demand made upon them for current was equal to 12,691 8-candle power lamps; while the capacity of the plant was equal to 30,000 lamps. The Committee expressed their dissatisfaction with the progress made by the contractors in completing the works; but it is expected that they will be in a position to supply current in about a fortnight's time.

The Douglas Town Council last Wednesday decided to establish an electrical undertaking on the lines suggested by Professor Fleming; and a Committee was appointed to take the necessary steps, reporting to the Council as to details. An amendment to ask the Electric Power Company for terms for supplying current for five years was rejected; and another to take the opinions of the ratepayers was treated as an opposition ruse for delay. The cost will be about £16,000.

It is a well-known fact that numbers of Local Authorities have applied to the Board of Trade for Provisional Orders for the supply of the electric light in their districts, with the object of preventing private Syndicates or outside Authorities from coming into their districts, rather than with any real intention of taking steps themselves in the matter. The Board of Trade have come to an important decision on this subject, by stipulating that Local Authorities to whom Provisional Orders are granted in future will have to carry out the work, though it might be considered more advantageous to approach a neighbouring town or borough authority, where electricity is being supplied, to extend their cables to their outside districts. In other words, when once a Local Authority apply for, and obtain a Provisional Order, no outside body, though the Authority concerned might be wishful for it to do so, can supply the district.

Two further steps were taken last week towards the carrying out of the municipal electric lighting scheme at Devonport; one being the appointment of an Engineer. From the list of candidates, a Sub-Committee selected eight names for special consideration; but the Electric Lighting Committee decided to interview only two, who live at Plymouth. One of these—Mr. Charles Furness—was recommended to the Town Council for appointment. When the matter came before the Council on Thursday, some objection was taken to the fact that they were left without any choice in the appointment; but the selection was confirmed. Mr. Furness is to enter upon his duties in June; and, in the meantime, he will consider, in conjunction with the Committee, the question of the site of the generating station. Professor Kennedy is to be retained as Consulting

Engineer. The other matter which indicates that the Council are in earnest was the adoption last Thursday of a resolution to proceed at once with the lighting by electricity of the roads of a district recently added to the borough. It is of a partly rural character, and in some portions of it the population is thin and scattered. The mover of the resolution, however, contended that the electric light would be cheaper than gas or oil; and he urged as a strong reason for taking the course he recommended that the installation could be made the commencement of the general electric lighting scheme.

Mr. Jones had what he truly called "a tall order" for the Southport Town Council at their meeting last Tuesday. He proposed that application be made to the Local Government Board for authority to borrow £55,000 for extensions of the electricity works and plant. The present borrowing powers of the Committee, he stated, amounted to £83,500; and the expenditure to the present time had reached £86,500, or £3000 in excess. This overspent money was included in the amount proposed to be borrowed. Several of the items in the estimate were urgent—viz., feeders, &c., including laying £2560, buildings £7000, boilers £4890, foundations, &c., £5950, and traction plant £12,600. He understood that the trams would be running twelve months after the necessary powers had been obtained. As to their revenue, the Committee were bold enough about a year ago to promise to subscribe something like £650 towards the rates. He was happy to say they were able to meet this obligation, and to have a good balance left. Alderman Fisher, who, from a ratepayers' point of view, did not consider the Committee's application a very modest one, moved, as an amendment, that the resolution should be referred back for consideration by three Sub-Committees, selected from the Electricity Committee, the Tramways Committee, and the Finance Committee. Alderman Threlfall seconded the amendment, and expressed regret that no detailed statement of the income of the Committee had been submitted to the Council. The Gas Committee last year gave £6500 to the rates, and this year were pledged to contribute £8000. The Electricity Committee had been allowed plenty of scope; and the Corporation ought not to permit them to continue spending the ratepayers' money without getting a return. Mr. Boocock said the programme of the Electricity Committee was to a large extent prospective and anticipatory; and he thought the Council ought to assist the Committee in doing a prospective good to the electricity plant. Among other speakers was Mr. Hesford, who said he objected to every estate being measured according to the work of the gas estate. No electrical undertaking of any corporation could pay an equal amount per £100 of capital invested as a gas committee could do. The capital of the Electricity Committee, on which they paid interest and sinking fund at the present time, was about £65,000. At the end of last month, they had made this year a gross profit of 8·38 per cent.; and he believed this had been since increased. In ten Lancashire boroughs, the average gross profit on electric light works for 1898 was 7·47 per cent.; but on the gas undertakings of the same places, the profit was only 7 per cent. Therefore he thought they had substantial reasons for believing they would go on prospering without injuring any other estate; but that they could pay as much to the pound as the gas undertaking he repudiated altogether. The capital on the electric lighting works had to be paid off in half the period allowed for the gas estate; and this was the reason why they could not hand over so much to the relief of the rates. The Gas Committee, too, had proportionately a very much larger number of consumers than the Electricity Committee. The gas capital per consumer was £24 in the towns where he had been able to obtain any information; but it was £100 in regard to the electric lighting estates—the explanation being that the plant was much more expensive. He saw no reason why they should not accept the amendment; but he could not agree with Alderman Griffiths that the Tramways Committee should come in and take any share whatever in the management of the electric light works. It was agreed that the minutes objected to should be taken back, and considered in conjunction with the Finance and Tramways Committee.

The Quality of Manchester Gas.—At last Wednesday's meeting of the Manchester City Council, Alderman Gibson, replying to a question put by Mr. Boyle, said it was the intention of the Gas Committee to purify the gas with lime; and the process was now in operation at the works in Rochdale Road. It had been in use about a week; and the result was that the sulphur had been reduced by pretty nearly 50 per cent. The Committee had the fullest hope that the purification of gas by lime would not only result in the removal of the sulphur, but would add to the illuminating power.

The Patent Gas Enrichment Syndicate.—A meeting of the proprietors of this Company was held a few days since to "consider the advisability of taking concerted action for the purpose of inquiring into the Company's affairs. Mr. R. E. Emson, who presided, stated that the whole of the circumstances in connection with the formation of the Company, which he himself had thoroughly investigated, made it necessary that the concern should be wound up under a compulsory order of the Court. The effect of such an order would be to place the undertaking in the hands of the officials of the Board of Trade, and by this means the shareholders would secure a thorough investigation into the history of the Company and the prosecution of Mr. Thomas Fenwick, the promoter, if, in the view of the Board of Trade, he should be considered guilty of fraudulent conduct. He proceeded to state the result of his investigation into the inception of the Company and its present position; referring to the use of a letter by Mr. George Livesey in the first prospectuses issued, and the prompt withdrawal of it by that gentleman the moment he learnt the real nature of the concern for the floating of which it was being published. In the discussion which followed, the promotion of the Company was severely criticized; the shareholders expressing the view that this was a clear case for investigation by the Board of Trade. Eventually a resolution was passed to the effect that the Company should be put into compulsory liquidation; and Messrs. Goodchild and Hammonds were instructed to carry out the necessary proceedings—the expenses being limited to a certain sum. Messrs. Smith, Bines, and Black were appointed a Committee to co-operate with the Solicitors, and Messrs. Emson and Co. A shareholder observed that Mr. Fenwick did not really hold the patents, and that, having examined them, as given in the prospectus, he had discovered that they had nothing whatever to do with the enrichment of gas.

PLYMOUTH CORPORATION WATER SUPPLY.

The Cost of the New Works—The Remuneration of the Engineer.

A detailed report has been prepared of the cost of the new storage reservoir constructed by the Corporation of Plymouth and of the pipe-line which has superseded the use of the ancient leat. The cost of land and easements, which was estimated at £13,514, comes out at £8196, or £50 9s. an acre. The pipe-line, estimated to cost £26,350, was completed for £24,734; the principal items of which were £13,006 for pipes and £8263 for wages. The Burrator masonry dam—the chief feature of the storage reservoir—was estimated to cost £104,473, including the expense of raising it 3 feet above the height originally contemplated. The actual cost is returned at £102,212; the largest items of expenditure being as follows: Excavations, £10,147; cement, £14,699; concrete, £4815; sand, &c., £5870; quarrying, £7304; dressing stone, £11,859; plant, £11,758; and valves, £3086. The Sheepstor dam—a subsidiary work—was estimated to cost £4905, but it has cost £23,937; the items being £4224 for excavations, £2837 for timbering, and £16,876 for construction. Works not included in the estimate came to £13,332. These included the following items: Enlargement of the reservoir to one-sixth greater capacity, £3750; 130 acres of extra land, £5734; and new road, £1956. Adding £3314 for payments yet to be made, the cost comes out at £179,175. Various credits, including rents and the receipts for plant sold on the completion of the works, amount to £7636. This leaves the net expenditure at £171,539, against an estimate of £150,000; but, after deducting the cost of enlarging the reservoir and other works not provided for, the actual expenditure in excess of the estimate was £8206. Another report presented to the Town Council yesterday week with the foregoing statement showed that the expenditure on the works, including the cost of the Act of Parliament, to the 31st of March last was expected to be £183,908, and that a sum of £2750 is to be spent in the present year; making a total of £186,658.

Alderman J. T. Bond, the Chairman of the Water Committee, explained that the whole cost of the works incidental to the reservoir was £183,842. The estimate was £150,000; but they had to add £4159, the cost of the parliamentary contest, £1500 paid for compensation, £262 paid to the Town Clerk as an *honorarium* in connection with the parliamentary proceedings, and £6382 interest paid out of capital during the construction of the works. Then there was the cost of the enlargement of the reservoir, the purchase of additional land, and other items of expense, which came to £13,333. The total of these figures was £25,636; and this subtracted from the total cost of the works left £158,206, which was the correct figure to be brought into comparison with the £150,000 estimated. On the cost of land and easements there was a saving of £5317; on the pipe-line, of £1615; and on the cost of the Burrator dam, of £2260. The Sheepstor dam alone explained why the estimate had been exceeded; the excess on that item amounting to £19,032. This was the most anxious and difficult task which the Water Committee and the Engineers encountered; but the heavy expenditure was justified by the result. The feeling of delight experienced when the Burrator works were opened in September last had not diminished; and there was a profound, deep, and abiding sense of relief in the mind of the people of Plymouth that at last the town had a water supply second to none in the country, and a storage reservoir of which it might be proud.

The Water Committee recommended that a further sum of 700 guineas be paid to the Water Engineer (Mr. E. Sandeman), in respect of the services rendered by him for carrying out the works in connection with the Burrator reservoir. Before the subject was discussed, three memorials were presented to the Council from six ratepayers in different parts of the town, urging the Council not to confirm what they described as "this preposterous resolution of the Water Committee."

Alderman Bond, in moving the adoption of the resolution, referred to the satisfaction expressed in the town at the manner in which the staff, and particularly Mr. Sandeman, had done their work. The remuneration which it was now proposed to give him was not a new idea. In December, 1895, the Council voted the Water Engineer 300 guineas in consideration of the services rendered by him in preparing the parliamentary plans, and also in carrying out the works in connection with the pipe-line; and it was then stated in the resolution that the consideration of the payment of any further remuneration for carrying out the works at Burrator should be deferred until the works were completed—the Committee retaining liberty of action to either grant or refuse it. By special arrangement, it was agreed that the commission of Mr. Mansergh, who was associated with Mr. Sandeman as Joint Engineer of the works, should be only 1 per cent., instead of 3 per cent. Mr. Sandeman was appointed as Water Engineer to look after the works in the town. He had been Engineer as well as Contractor for these important works; and although the Council had voted him the sum of 300 guineas for the work in connection with the pipe-line, and 100 guineas for pricing the quantities, and had added £50 a year to the salary which he was promised when he came to Plymouth, he was entitled to the recognition which the Committee proposed. The payment of the sum out of capital would involve a charge to the rates of only £25 a year until it was repaid. No such works had been constructed in the country on a less commission than 2½ per cent.; but in this case the whole engineering costs, including this sum, were less than 2 per cent.

A long debate followed. The opponents of the proposal argued that the system of paying bonuses or commission to Corporation officials was bad in principle, and that in this case it was instituting a dangerous precedent. They denied that Mr. Sandeman was underpaid. The ratepayers were feeling the burden of a heavy debt and high rates; and it was the duty of the Council to be just before they were generous. No promises, it was said, had been made to Mr. Sandeman; at least if there was a promise it was a secret one on the part of the Water Committee, and the Council were not bound by it. If there was any moral obligation, those who incurred it—namely, the members of the Committee—should discharge it. On the other hand, stress was laid on the fact that the special arrangement with Mr. Mansergh, which had probably saved the town £4000, evidently contemplated the adequate remuneration of Mr. Sandeman. In any case, there was a promise upon which the Water Engineer naturally relied; and it was not right for the town to "sweat" its officials. In the end, the recommendation was rejected by 40 votes to 11.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

That the open policy adopted of late years by the Waverley Association of Gas Managers has tended to the popularizing of this body, there can be no doubt. The meeting in Edinburgh, on Thursday, was the biggest they have ever held. Not only were the members present almost to a man, but there were also numerous visitors—managers of gas-works outside the Waverley zone or sphere of influence. On account of the constitution of the Association—there being no rules except those imposed by custom—the gathering is quite as informal as is that which is held in Glasgow every spring. There was, when the proposal was first made, some doubt among the members as to the expediency of meeting in Edinburgh, which was considered outside the Waverley district, though why this should have been it is difficult to understand, seeing that Edinburgh is the source from which all that there is of Waverley in the world emanated. But the result has justified the proposal, for the two meetings which have been held in the city have been the most successful known. Mr. A. P. Main, of Glasgow, in proposing the toast of "The Waverley Association of Gas Managers," very neatly brought out the sentiment I have introduced here, though in another sense, in the remark that they were at the moment met almost within a stone-throw of the spot where Sir Walter Scott wrote most of the "Waverley Novels." There was another incident at the dinner which is worthy of preservation. Mr. A. Bell, sen., of Dalkeith, gave the toast of "Kindred Associations," and in doing so said that he remembered when there were no associations of gas managers. Flintoff went about the country making his wild assertions; and there was nobody to contradict him, except an isolated individual here and there. It was felt that there should be some sort of combination among gas managers. Till then they had been living in distrust of each other. Each had his own fads, and there was no communication of information by one to the other. Neither was there admission to one another's works. Gas managers met in twos and threes occasionally; and they never met but they quarrelled. How different it was now. They were all friends; they could come and go to each other's places; and each interchanged information with the other. There is great force in these remarks. They require to be brought home, before managers who have arisen under the modern *régime* can realize to the full the benefits which are derived from the formation of Associations. In this work, the Waverley Association had the pioneer part; and, as was remarked by one speaker, though old there is no sign of enfeeblement about the body, but rather the opposite—there is a renewal of vigour.

Apropos of the presentation to Mr. W. Blair on his leaving Haddington to take up the duties of Gas Manager at Helensburgh, and of the remarks which I made in my "Notes" of March 14 last, I feel it appropriate, on fuller knowledge, to make a statement which, I believe, will be the cause of some amazement. It seems that Mr. W. Smith, who is still the Manager at Helensburgh, can, in no sense, be said to be "retiring" from office; the truth being that he is being "deprived" of it. When the proposal was made by the Corporation to take over the gas undertaking, he lent all the assistance he could to it, as being a desirable step in the interests of the community. The transfer was carried through in such a friendly manner that no one ever dreamt that there would be any other arrangement than that Mr. Smith's services would be retained as Manager. Not a word was spoken on the subject, on one side or the other; and consequently Mr. Smith and his friends were thunderstruck when an advertisement by the Corporation appeared, inviting applications for the post of Manager of the Helensburgh Gas-Works. Mr. Smith was advised to apply for the situation, lest it should be said that, because he had not applied, he did not want it. He did so, but received no support in the Corporation; Mr. Blair obtaining the appointment unanimously. Now Mr. Blair is in no way to blame for what has happened; he simply applied, along with others, for a situation which was represented to be vacant, and he secured it. Can the Corporation be held to be blameworthy in the matter? Well, it is difficult to say that much rests upon them. In taking over the concern, they were naturally anxious to start with a staff the members of which would not be falling in in a few years as pensioners. But there is surely some moral responsibility upon a Corporation in such a matter. Though not in the employment of the Corporation, during the 52 years that Mr. Smith has been Manager at Helensburgh, he has, nevertheless, been in a position where he has rendered great service to the community; and to treat a man as the Corporation have treated Mr. Smith, is to make a fellow human being too much of an inanimate tool. But what about the Directors of the Gas Company? They are still in power; the Company being the owners of the undertaking till May 15 next. They have funds in their hands out of which they may make pecuniary compensation to Mr. Smith, which is all that can be done now; and if they do not, will it be possible to find language strong enough with which to reprobate their conduct? The facts are so strong that no one can get away from this conclusion. Mr. Smith has served the Company so well that for very many years they have paid a dividend of 25 per cent.; yet during all this time his salary was not raised. Picture the man. Unselfish, living only for his Company; making it prosperous; rewarded by a remuneration which rendered it impossible for him to make provision for a rainy day; by unforeseen and altogether exceptional circumstances turned adrift in his old age; and neither the party who are going out, nor the party who are coming in, offering to make any provision for him.

The Dundee Town Council on Thursday fixed their coal contracts for next year at an average price of 2s. per ton over those of the current year. They have contracted for 43,500 tons, which is much less than their requirement; but they have 20,000 tons in stock and undelivered, which raises the total quantity available to 63,500 tons. The estimate is that they will require 60,000 tons; and thus they calculate that they will make up the quantity. If they should not, their expectation is that they will be able to go into the open market next spring, when, in all probability, coal will be cheaper, and buy what they require. The arrangement seems to be the safest one which the Council could have adopted. But before the councillors made up their minds, there was a great deal of desultory conversation. This was started by one member desiring to know why, in view of the repeatedly tendered advice of Mr. Foulis to go in for making more coke, they were ordering so much cannel. The statement was made, in explanation, that they were ordering 19,000 tons of cannel, of which only 12,000 tons did not produce coke, as against 32,000 tons last year. It was

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 966.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 19	10½	Alliance & Dublin 10 p. c.	21½—22½*	..	4 13 4
100,000	10	,,	7½	Do. 7 p. c.	15⅝—16⅝*	..	4 10 11
800,000	100	Jan. 3	5	Australian 5 p. c. Deb. .	104—106	..	4 14 4
200,000	5	Nov. 11	6	Bombay, Ltd. . . .	6⅞—7⅛	..	4 2 9
40,000	5	,,	6	Do. New, £4 paid .	4⅞—5⅛	..	4 11 5
880,000	Stk.	Feb. 24	12	Brentford Consolidated	275—280	..	4 5 9
240,000	,,	,,	9	Do. New . . .	213—218	..	4 3 7
50,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0
159,375	,,	Dec. 15	4	Do. 4 p. c. Deb. .	128—133	..	3 0 2
220,000	Stk.	Mar. 29	11½	Brighton & Hove Orig. .	265—270	..	4 5 2
226,320	,,	,,	8½	Do. A. Ord. Stk. .	194—197	..	4 6 4
978,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max. .	125—130	..	3 16 11
490,000	20	Mar. 29	10	British	47—49	..	4 1 8
50,000	10	Feb. 24	12	Bromley, Ord. 10 p. c. .	25—27	..	4 8 11
75,000	10	,,	9	Do. 7 p. c. . . .	20—22	..	4 1 10
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd.	11—11½	+⅛	5 4 4
220,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb. .	103—105	+1	3 16 2
150,000	20	Mar. 10	8½	Cagliari, Ltd. . . .	28—29	..	5 13 10
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.	14—15	..	4 13 4
50,000	50	Nov. 2	6	Do. 6 p. c. 1st Mort.	57—59	..	5 1 8
550,000	Stk.	Apl. 13	13½	Commercial Old Stock .	310—315*	+1½	4 5 9
200,750	,,	,,	10½	Do. New do. .	240—245*	+½	4 5 9
200,750	,,	Dec. 15	4½	Do. 4½ p. c. Deb. .	145—150	..	3 0 0
800,000	Stk.	Dec. 15	10	Continental Union, Ltd.	203—208	..	4 16 2
200,000	,,	,,	7	Do. 7 p. c. Pref. .	187—192	..	3 19 11
61,600	Stk	Feb. 24	14	Croydon A 10 p. c. . .	305—310	..	4 10 4
102,400	,,	,,	11	Do. B 7 p. c. . .	255—265	..	4 3 0
555,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	180—185	..	3 17 9
60,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0
486,090	10	Jan. 27	11	European, Ltd. . . .	23—24	..	4 11 8
854,060	10	,,	11	Do. £7 10s. paid .	17—18	..	4 11 9
14,993,075	Stk.	Feb. 10	4⅗	Gas- 4 p. c. Ord. . .	116—118	..	4 3 0
2,600,000	,,	,,	3⅗	light 3½ p. c. max. .	101—103	..	3 8 0
3,799,735	,,	,,	4	and 4 p. c. Con. Pref.	127—129	..	3 2 0
3,843,975	,,	—	—	Coke 3 p. c. Con. Deb.	101—103	..	—
70,000	10	Nov. 11	8	Hongkong & China, Ltd.	14—15	+⅛	5 6 8
3,800,000	Stk.	,,	10	Imperial Continental .	223—228	..	4 7 9
376,400	100	Feb. 1	4	Do. 4 p. c. Deb. Red.	98—101	..	3 19 3
473,600	Stk.	Feb. 10	8½	Do. 8½ p. c. Deb. ,,	102—105	..	3 6 8
75,000	5	Nov. 30	6	Malta & Medn., Ltd. .	5—5½	..	5 9 1
560,000	100	Apl. 4	5	Met. of 5 p. c. Deb.	111—113	..	4 8 6
250,000	100	,,	4½	Melbourne 4½ p. c. Deb.	105—107	..	4 4 1
541,920	20	Nov. 11	5	Monte Video, Ltd. . .	15½—16½	..	6 1 3
617,946	Stk.	Feb. 24	9½	Newc'tle & Gatesh'd Con.	228—233	..	3 19 5
264,855	Stk.	Dec. 30	8½	Do. 8½ p. c. Deb. .	107—110	..	3 8 8
150,000	5	Nov. 30	8	Oriental, Ltd. . . .	7½—7⅝	..	5 3 3
135,000	5	,,	8	Do. New, £4 10s. pd.	6½—6⅝	..	5 6 3
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1⅜	..	4 11 5
60,000	5	Mar. 29	7	Ottoman, Ltd. . . .	4⅞—5⅛	..	6 13 4
500,000	100	Dec. 1	6	People's Gas 2nd Mtg. of Chicago Bonds .	102—106	..	5 13 2
848,070	10	Oct. 13	7†	River Plate Ord. . . .	11⅞—12	+⅛	5 16 8
250,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb. .	103—105	..	3 16 2
250,000	10	Mar. 29	10	San Paulo, Ltd. . . .	16½—17½	..	5 14 3
135,000	Stk.	Mar. 29	10	Sheffield A.	237—240	..	4 3 4
209,058	,,	,,	10	Do. B.	237—240	..	4 3 4
447,427	,,	,,	10	Do. C.	237—240	..	4 3 4
5,600,000	Stk.	Feb. 10	5⅓	South Metrop., 4 p. c. Ord.	140—143	..	3 14 7
1,460,000	,,	Jan. 13	3	Do. 3 p. c. Deb. . .	101—103	..	2 18 3
—	—	—	—	Tottenham and A. . Edmonton B. .	—	—	—
—	—	—	—	Tuscan, Ltd.	—	—	—
183,380	10	Dec. 30	5	Do. 5 p. c. Deb. Red.	99—101	..	4 19 0
149,900	10	Jan. 3	5				
				WATER COMPANIES.			
746,184	Stk.	Dec. 30	11	Chelsea, Ord.	318—323	..	3 8 1
150,000	,,	,,	5	Do. 5 p. c. Pref. .	168—173	..	2 17 10
160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	150—155	..	2 18 1
175,785	,,	Mar. 29	4½	Do. 4½ p. c. Deb. .	155—160	..	2 16 3
1,720,560	Stk.	Apl. 13	7	East London, Ord. . .	217—220*	+1½	3 3 2
654,740	,,	Dec. 30	4½	Do. 4½ p. c. Deb. .	156—159	..	2 16 7
200,000	,,	,,	3	Do. 3 p. c. Deb. .	102—104	..	2 17 8
700,000	50	Dec. 15	7½	Grand 10 p. c. max. .	172—175	..	3 5 3
310,000	Stk.	Mar. 29	4	Junction 4 p. c. Deb. .	135—140	..	2 17 2
708,000	Stk.	Feb. 10	14	Kent	357—362	..	3 17 4
160,000	,,	,,	7	Do. New, 7 p. c. max. .	210—215	..	3 5 1
1,043,800	100	Dec. 30	10½	Lambeth, 10 p. c. max. .	298—303	..	3 9 4
406,300	100	,,	8	Do. 7½ p. c. max. .	230—235	..	3 8 1
850,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb. .	135—140	..	2 17 2
500,000	100	Feb. 11	13⅓	New River, New Shares	433—438	..	3 2 9
1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Deb. .	137—142	..	2 16 8
902,300	Stk.	June 29	7½	South- Ord. . . .	203—208	..	3 12 1
126,500	100	,,	7½	wark 7½ p. c. max.	193—196	+1½	3 16 6
489,200	Stk.	,,	5	and 5 p. c. Pref.	168—171	..	2 18 6
1,019,585	,,	Apl. 13	4	Vauxhall 4 p. c. A Deb.	135—140*	..	2 17 2
1,155,066	Stk.	Dec. 15	10	West Middlesex . . .	300—305	..	3 5 7
900,000	,,	,,	4½	Do. 4½ p. c. Deb. .	159—162	..	2 15 7
200,000	,,	Mar. 10	8	Do. 3 p. c. Deb. .	101—103	..	2 18 3

* Ex div.

† Next dividend will be at this rate.

also explained that last year the revenue from coke was about £1200; but this year they expected to make from 8000 to 10,000 tons of coke, which, at the present price, would give them a revenue of about £3500. The increase in the price of coal would be between £4000 and £5000.

The Council had laid before them Mr. Foulis's plans for the reconstruction of the works, regarding which a councillor remarked, I think mistakenly, that the new plans were altogether different from what Mr. Foulis at first submitted. They have taken so long over the matter that it need be no wonder if some should forget what they did at the beginning. It was also pointed out that the new plans showed that not a vestige of the existing gas-works would be left, except one gasholder. This seemed to be rather more than the Council were prepared for, and as there was a question about two sets of plans—those of Mr. M'Crae, the Manager, and of Mr. Foulis—it was agreed that the plans should lie in a convenient place for the councillors to inspect them, and that then a special meeting of the Council should be held to consider them. It will be a wonder if this does not lead to further delay.

The Falkirk Gas Commissioners on Monday agreed to appoint Mr. J. M'Gilchrist, of Dumbarton, along with Mr. J. Kincaid, the Manager at Falkirk, to examine the gas-works, and report on their condition. These gentlemen are also asked, in framing their report, to keep in view the possible effect which the introduction of electric lighting might have upon the demand for gas; so that, in the event of their recommending that a new gas-works be erected, the Commissioners might have information to proceed upon. It was reported that during the month of February there was a loss of nearly £52 in the working of the gas undertaking. This, it was explained, was considered to be small; and it was further reported that Mr. Kincaid was giving every satisfaction, that he was producing excellent gas, and that the expenses were going down every day. Mr. M'Gilchrist is a native of Falkirk, and Mr. Kincaid was his pupil; so there is a nice family sort of arrangement here. Mr. M'Gilchrist has also been asked by the Kelso Gas Company to make a valuation of their plant and assets, for Company purposes.

The Dunfermline Gas Commissioners have not yet, it turns out, approved of the suggestions made by Mr. Hubert Pooley, their Manager, regarding the extension of the carbonizing portion of the gas-works and the construction of plant for the recovery of sulphate of ammonia. They had the proposals again before them on Monday; and they resolved to delay for a year the subject of the extension of the carbonizing plant. On the question of whether they should manufacture sulphate of ammonia, the Commissioners considered that they should have further information; and they resolved to send a deputation, including the Manager, to visit gas-works in Scotland where sulphate of ammonia is manufactured.

The Cowdenbeath Police Commissioners have again had before them an account by the Gas Company for the gas consumed in the street-lamps, charged at the rate of 7s. 6d. per 100 cubic feet. The Commissioners had offered to pay at the rate of 5s. per 100 cubic feet; but that offer the Company declined to accept, and demanded payment in full. The Commissioners this week refused to alter their offer.

The Stirling Gas Company, feeling aggrieved at statements which had been made in the Town Council regarding the extinguishing of the public lamps, have written to the Council giving notice of the termination of the existing contract for the lighting of the streets at the end of six months. The Gas Company at present light and extinguish the street-lamps; but the Town Council will now be obliged to undertake the duty. The Gas Company are having a very prosperous time. As the result of a recent exhibition of gas appliances, they have sent out about 100 gas-cookers. They have also, by means of prepayment meters, secured about 300 new consumers of gas. Their consumption has, in consequence, considerably increased. All this should be food for reflection for the wiseacres who, in fear that there was no future in Stirling for gas supply, defeated the proposal to transfer the gas-works to the Corporation.

The Oversman in the Troon gas transfer (Mr. S. Stewart, of Greenock) has given his final award. The figure he fixes is £6019, the same as he gave in February last. The claim by the Gas Company was for £8200. The date of entry of the Police Commissioners to the undertaking has been altered from May 1 to June 7, which makes it correspond with the end of the financial year of the Company.

A proposal in Annan to adopt the Burghs Gas Supply Act, with a view to the Police Commissioners taking over the undertaking of the Gas Company, has been abandoned, according to the Lighting Committee of the Corporation, because of the attitude of the Gas Company. Having failed to come to terms amicably, the Corporation are to be moved to enter upon a policy of persecution. Notice of motion has been given to the effect that the Gas Company be communicated with on the subject of their granting a reduction in the price of gas, or, failing a reduction satisfactory to the Corporation, that steps be taken to require the Gas Company to pay way-leave for their pipes in the streets. The price of gas at Annan is 3s. 9d. per 1000 cubic feet, which, on all points of comparison with places similarly situated, is quite moderate.

The Perth Gas Commissioners this week fixed their coal contracts for next year at an average price of 2s. per ton more than they are at present paying. Notwithstanding this, it is not expected that it will be necessary to raise the price of gas; but, according to the Convener of the Works Committee, they are, on the contrary, to try to get it down. The illuminating power of the gas was reported to have been of an average of 24·18 candles. This was complained of as being below the agreed standard of 26 candles, to which the reply was given by the Convener of the Works Committee that to increase the candle power would mean 1½d. on every 1000 cubic feet of gas, and that he thought gas of 25-candle power was as good as need be. Lord Provost Dewar admitted that they had resolved to supply gas of 26-candle power; but he thought gas of 24 candles would suit most people. Then his Lordship gave vent to the extraordinary sentiment that, whether the gas were of 14, 15, 24, or 26 candle power, did not make any difference in the gas account. The bill seemed to be always going up. There followed, as a sort of crown to this marvellous exhibition of incompetency to control a gas undertaking, a notice of motion in these terms: "In view of the appointment of Mr. Gillespie, and the additional expense incurred in the building of the new gas-works, it is desirable that Mr. Wilson's appointment as Gas Manager should be reconsidered." Truly there are mysteries in the workings of the Municipality of Perth which, to the average outsider, are incomprehensible.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

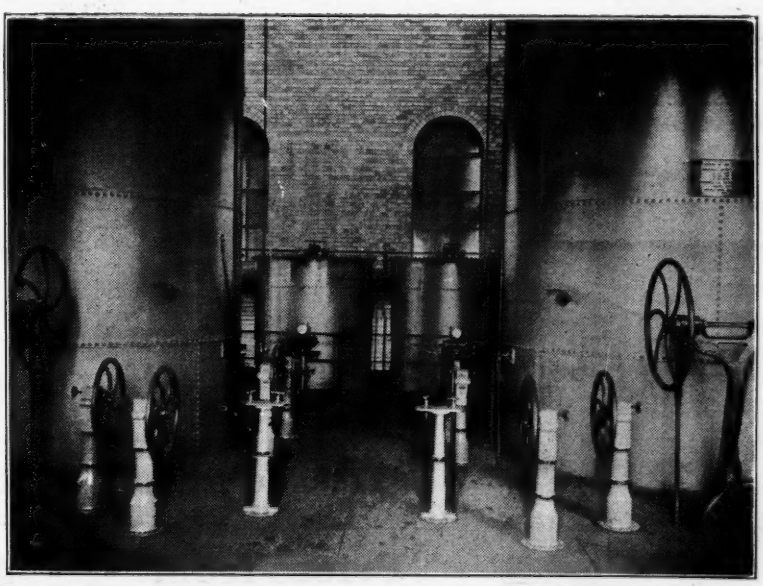
The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

THE M.-W.-P. PLANT is designed to use the Heaviest as well as the Lightest Grade of Oil.



RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.
The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 15.

Sulphate of Ammonia.—During the greater part of the week, the market has been quiet, and somewhat irregular; but at the close it is firmer at £10 15s. to £10 17s. 6d. per ton delivered f.o.b. at the ports. Makers have offered sparingly, having contracts to deliver against, and having only current production to deal with. Second-hand parcels have, however, again been offered at below makers' prices; and quotations were disseminated abroad at a still further discount for April-May delivery. But when it was seen that there were considerable requirements to be filled, and when buyers began to close with the offers, sellers advanced their prices to the spot level. The forward position has attracted more attention; and the closing quotation f.o.b. Leith for July-December delivery is again £10 10s. per ton.

Nitrate of Soda is a shade easier on spot, owing to arrivals; and the quotation is now 8s. 4½d. per cwt. for fine quality, *ex* quay Liverpool.

LONDON, *April* 15.

Tar Products.—The market for benzol is still a very disappointing one for makers; and although business is possible in 50's at the very low price now quoted, in 90's it is practically impossible to sell for spot delivery. It is hoped that the continued low price of 90's will divert considerable quantities into gas-works for enrichment purposes. The future prospect for 90's is gloomy, as new coke-ovens are continually being started; and more and more benzol is thus put on the market. There is a fair demand for naphthas; and creosote and tar oils are steady. Pitch is slightly weaker if anything; but the season for shipment is rapidly drawing to a close. There is no fresh news in respect to anthracene, the quotation for which is still nominal. Carbolic acid has maintained a marvellously uniform price for twelve months; the demand and supply being apparently equally balanced.

Prices are as follows: Tar, 14s. 6d. to 20s. 6d. Pitch, east coast, 26s.; west coast, 24s. Benzols, 90's, 7d.; 50's, 7¾d. Toluol, 10d. Solvent naphtha, 1s. Heavy naphtha, 1s. Crude, 30 per cent., naphtha, 3d. Creosote, 3½d. Heavy oils, 57s. 6d. Carbolic acid, 60's, 2s.; 75's, 2s. 8d. Creosote salts, 45s. Anthracene, "A," 4½d.; "B," 3½d.

Sulphate of Ammonia.—The position is now better; after a fall of several shillings, new orders have come, and there is some scarcity of stuff for prompt delivery. Although buyers will not pay to-day's quoted price for sulphate for forward delivery, there are few makers who will sell for less. Business has been done for early delivery at £10 15s., less 3½ per cent. at many points; and this may be taken to be about the average value U.K.

Scarcity of Coke at Torquay.—We learn from a provincial paper that coke is dearer than coal at the present time at Torquay. So scarce has coke become that it has had to be imported from Bristol, Dublin, and other places; and the demand is so great that carts wait while it is drawn from the retorts.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The general trade of the Lancashire district continues exceptionally active; all descriptions of fuel not only meeting with a ready sale, but supplies of some of the lower qualities for iron-making, steam, and general manufacturing purposes are short to meet requirements. Collieries are still moving away their output of the better qualities of round coal, for house-fire purposes; and prices are strong at the full rates—averaging 12s. to 12s. 6d. per ton for best Wigan Arley, 10s. 6d. to 11s. for Pemberton four-feet and seconds Arley, and 9s. 6d. to 10s. for common house coal at the pit. Steam and forge coals are in pressing demand; and good qualities are fetching 9s. at the pit. There is a continued scarcity of engine fuel; and many of the collieries are barely able to keep up with the requirements of their regular customers. The result is that new business is extremely difficult to place, even where buyers are prepared to pay special prices to secure supplies. At the pit mouth, prices are very firm at 5s. 3d. to 5s. 6d. for common slack, 5s. 9d. to 6s. for medium, up to 6s. 6d. and 6s. 9d. for best sorts; and in some instances an extra premium on these figures is quoted where special supplies are asked for.

Northern Coal Trade.—There is an increased demand for several classes of coal this week, and in several cases a corresponding improvement in the price. In best Northumbrian steam coals, the enlarged demand has forced up the price to 12s. per ton f.o.b.; and at this figure there is the strong demand that is usual at this time of the year, when heavy shipments to the Northern ports are just about commencing. Steam smalls are also higher, at 6s. per ton. In the gas coal trade, some of the heaviest of the contracts for the supply of the London Companies have been closed this week; and, though the exact prices are not yet obtainable, it is believed that the rate will not be far short of about 8s. per ton f.o.b. in the Tyne—a figure which shows a very substantial increase on that ruling in the contracts now near expiring. For single cargoes the quotation for best Durham gas coals is from 8s. 6d to 9s. per ton f.o.b. Prices of gas coke are firm, without alteration.

Scotch Coal Trade.—The market remains firm, with, if anything, prices hardening. Stocks are being increased at home, which accounts for the upward tendency. Splint and ell are the varieties most in demand; the latter being chiefly for shipping purposes. The prices quoted are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow; ell 9s. 6d. to 10s. 3d.; and splint 9s. 9d. to 10s. The shipments for the week amounted to 162,004 tons—a decrease of 7530 tons upon the previous week, and of 20,589 tons upon the corresponding week of last year. For the year to date, the total shipments have amounted to 1,954,347 tons—an increase of 79,053 tons upon the same period of last year.

Strange Cause of a Fire.—It is something new to be told that a gas-flame is a source of danger owing to its liability to throw off "sparks;" yet "a spark from a gas-light" was a few days ago officially given as the cause of a fire in Shoreditch.

R. & A. MAIN, Ltd.

Argyle Works, GLASGOW. — **109, Farringdon Road, LONDON, E.C.**

Telegrams: "GASMAIN, GLASGOW." — Telegrams: "GASMAIN, LONDON."

BRISTOL: 28, BATH STREET. Telegraphic Address: "GOTHIC."

BIRMINGHAM: 1, OOZELLS STREET. Telegraphic Address: "GOTHIC."

MANCHESTER: 87, BLACKFRIARS STREET. Telegraphic Address: "GOTHIC."

THE

"Main" Cooker,

With Enamelled Grids and Shelf Guides.

SEVERAL COLOURS OF ENAMELLED LININGS.

Prices from - - £4 12s. 6d.

NEW SEASON'S LIST NOW READY.

A Large Gasholder for Blackpool.—The Blackpool Corporation are having a large gasholder erected on the east side of their gas-works; the Contractors being Messrs. Clayton, Son, and Co., of Leeds, and Messrs. Dent and Sons, of Nelson—the latter firm constructing the tank. The new holder will have a capacity of rather more than 1½ million cubic feet; or more than the two now in use contain together. It is of steel and wrought iron; and the total cost is estimated at £20,000.

Explosion in a Gas-Lighted Safe at Liverpool.—A serious explosion of gas occurred yesterday week at the offices of Messrs. Massey, Dixon, and Syers, of 13, Harrington Street, Liverpool. A large air-tight safe, which is lighted by means of a gas-bracket provided with a bye-pass, was found to be full of gas, presumably caused by the flame of the bye-pass having been extinguished by the draught from the door in closing it on the previous Saturday afternoon. A clerk named William Scott struck a match causing an explosion, whereby both he and an office boy named Percival were shockingly injured, and five large panes of glass were blown out, as well as one on the opposite side of the street.

Electric Lamps Superseded by Incandescent Gas-Lights in Birkenhead Streets.—At Wednesday's meeting of the Birkenhead Town Council, the Chairman of the Watch Committee said the members would notice that they asked for permission to fix incandescent gas-burners to certain electric lamps in one of the thoroughfares, and put incandescents in place of ordinary burners in some of the lamps. It was proposed to put two burners in each lamp consuming 3 cubic feet of gas an hour per burner; and at midnight one of them would be turned out. The present lamps burned 5 or 6 feet an hour all the time they were lighted. There would be a slight additional cost for erecting, but there would be a saving in the end. He was sorry to say they could not ask for an extension of the electric light system, as the four large arc lamps in Grange Road were necessitating a cost of £25 each per annum. If the incandescent lighting was as successful in Birkenhead as it had been in Liverpool, they would soon be able to extend the system.

The Reading and Recreation Room at the Dover Gas-Works.—We have on previous occasions called attention to the cordial relations existing between the Directors of the Dover Gas Company and their workmen, as manifested at the gatherings which take place from time to time in the reading and recreation room established at the works. On the evening of the 29th ult., there was a very pleasant and enjoyable function at which this feeling was once more displayed, and the services rendered for several years past by the President of the room—Mr. Raphael Herring, the Company's Manager—were recognized by the presentation to him of his portrait, accompanied by an illuminated address. The Hon. Secretary (Mr. H. Harman) referred to the numerous benefits derived by the men from the reading-room; and, on their behalf, he asked the Chairman of the Company (Mr. W. Mannering) to make the presentation. Mr. Mannering complied, and expressed the hope that the President might live long to assist in the good work carried on in the room. Mr. Herring, in acknowledging the gift, said it always gave him the greatest pleasure to do what he could for all concerned—in fact, he regarded it as a labour of love. The remainder of the evening was devoted to harmony.

New Joint-Stock Company.—The Strathaven Gas Company was registered in Edinburgh last week, to take over the works and assets of the Company. The capital is £2709, in 3612 shares of 15s. each.

Accident at the Brighton Gas-Works.—A serious accident occurred at the Brighton and Hove Gas-Works at midnight yesterday week, to a young man named Alfred Nutley. He was assisting in wheeling a trolley used in unloading a shipload of coal, when he accidentally fell between the rails on to his head, a distance of about 12 feet. He was picked up in an unconscious state, and conveyed to Hove Hospital, where it was found he was suffering from severe concussion of the brain.

The Bolton Corporation and their Tar Tenders.—The Gas Committee of the Bolton Corporation, having again considered the question as to the acceptance of tenders for the make of tar during the ensuing twelve months (see *ante*, p. 928), decided to offer Messrs. J. Turner and Co., of Queen's Ferry, Flintshire, 3200 tons, and the Burnden Tar Company, Bolton, 2200 tons, at the prices named in their original contracts (understood to be 27s. 7d. and 27s. 6d. per ton respectively). The firms named have agreed to this allocation; communications from them to this effect being read at a meeting of the Gas Committee last Friday. As to the 10 per cent. reserved for local firms, the Committee have now decided to divide it equally between Messrs. J. Hutchinson and Co., of Bolton, and Mr. W. H. Dale, of Tyldesley.

Newtown District Council and the Gas-Works.—The Gas Committee of the Newtown Urban District Council have presented a report to that body setting forth the result of the conference at the offices of the Board of Trade as to the application of the Newtown Gas Company for a Provisional Order. The Committee state that the result of the conference is that the Board have decided, among other things, to grant the Order on the following conditions: (1) To make a reduction in the price of gas from 5s. to 4s. 7d. per 1000 cubic feet; (2) to reduce the additional capital from £10,000 to £6000; and (3) to lower the rate of dividend from 10 to 8 per cent. The Board of Trade could not see their way to create a precedent by inserting a purchase clause in the Order; but they have left this question to be decided by Parliament.

Buenos Ayres (New) Gas Company, Limited.—The accounts to be submitted at the annual general meeting of this Company on the 25th inst, show that the result of the year's business was a profit of £60,217, to which has to be added the balance of £4681 brought forward; making a total of £64,898. Continuing the policy which has been pursued by them for many years, the Directors have charged against the revenue of the year the sum of £7873 on account of new plant and depreciation of services; and after placing £14,488 to a special reserve account (bringing this up to £20,000, in addition to the present reserve fund of £25,000), and paying the fixed charges, there remains to be dealt with the sum of £33,736. From this amount £12,500 has been paid to the shareholders as an interim dividend; and the Directors recommend that a final dividend of 7s. per share be declared and paid (free of income-tax), making 6 per cent. for the year 1898, and leaving £3736 to be carried forward.

COALBROOKDALE COMPANY, LIMITED.

Established 1709.

1, VICTORIA EMBANKMENT, NEW BRIDGE STREET,

Works:
COALBROOKDALE, R.S.O., SHROPSHIRE.
Telegrams: "DARBY, COALBROOKDALE."

LONDON, E.C.
Telegrams: "SEVERNDALE, LONDON."
Telephone: 1026 Holborn.

THE

COALBROOKDALE

GAS-COOKERS.

THOROUGHLY MODERN, STRONG, AND WELL MADE.

The Patent Door saves much labour and cost in cleaning. Grease cannot get into the packing. No screws on Enamel surface to set up corrosion.

The Ossett Gas-Works Purchase.—At a statutory meeting of the Ossett Town Council held last Wednesday evening the Mayor (Mr. F. L. Fothergill) presiding—a resolution was submitted for the promotion in Parliament, either alone or in conjunction with the Horbury District Council, of a Bill for the purchase, compulsorily or otherwise, of the undertaking, works, and plant, of the Ossett Gas Company, and for powers to borrow money in connection therewith. Nine members voted for the resolution, one against it, and four (including a Director of the Company) were neutral. The resolution was consequently carried.

River Plate Gas Company, Limited.—At the second annual general meeting of this Company next Thursday, the Directors will report a total profit for the year ending Dec. 31, of £110,636, as compared with £80,662 in the preceding twelve months. Adding to the first-named sum the amount brought forward (£10,967), there is produced a total of £121,603. After payment of all fixed charges, making allowance for bad and doubtful debts, and providing fully for the maintenance of the works, mains, &c., there remains to be dealt with the sum of £100,461. Out of this the interim dividend at the rate of 6 per cent. per annum (free of income-tax), amounting to £25,532, was paid in October last; and the Directors recommend the appropriation of the balance as follows: To the reserve fund (raising it to £40,000), £20,000; to a special contingency fund, £10,000; and the payment of a final dividend for the year at the rate of 8s. per share, making 7 per cent. for the year (free of income-tax), £34,043—leaving a balance of £10,886 to be carried forward. During the past year, the sum of £21,029 was spent out of revenue on the upkeep of the works and mains, &c. A complete installation of automatic charging and drawing machinery has been erected at the Corrales works, and has given entire satisfaction. The mains were increased last year to the extent of about 10 miles; and 1600 new house services were connected with the Company's system.

The Bolton Corporation Water-Works Undertaking.—The Bolton Corporation having made application to the Local Government Board for sanction to borrow £1600 and £4500 for improvements in connection with their water-works undertaking, two Inspectors for the Department (Mr. P. H. Bagenal and Dr. Buchanan) attended at the Bolton Town Hall on Friday to hear evidence on the matter. The Town Clerk (Mr. R. G. Hinnell) explained that the £1600 was required to purchase a small estate situate on the north-westerly side of the Corporation's reservoir at Entwistle; and the object in securing it was to protect the water from pollution. He added that they had, by a Provisional Order of 1894, power to borrow £100,000 for the purpose of purchasing lands within their watershed area, subject to the sanction of the Local Government Board; and of this sum £81,769 had been obtained and expended. Up to the present the Corporation had acquired 1785 acres within their gathering-ground; and on these lands there were 36 houses. Extra precautions had been taken to prevent pollution from these buildings. Replying to Dr. Buchanan, the Water Engineer (Mr. R. H. Swindlehurst) said the total population supplied with water was upwards of 271,000; the Corporation being under contract to serve a number of townships beyond the borough limits. The £4500 was required to complete the filtration works at the Belmont reservoirs. There was no opposition to the application.

Huddersfield Corporation Stock.—The Huddersfield Corporation last Tuesday decided to create an additional amount of stock to the extent of £600,000. Of this large sum, £290,485 is required for the reduction of the existing water-works loans and further extensions; and £293,715 for the "borrowing fund," including electricity supply, reduction of existing loans, and further extensions.

The Yeovil Gas-Works Purchase.—At the meeting of the Yeovil Town Council on Monday last week, the Finance Committee recommended that the amounts required for paying the costs of the Yeovil Corporation Act, 1898, and for purchasing the gas-works be raised by loans from the Public Works Loan Commissioners; the first being raised at 2¾ per cent., and the second at 3 per cent. interest. Mr. Hack expressed the opinion that the Committee had not estimated for a sufficient amount, in view of probable improvements. The recommendations were adopted. Messrs. Pittard, Raymond, Petter, Johnson, and Watts were elected as the Gas Committee. Mr. Hack drew attention to the award in connection with the purchase of the gas-works, and expressed regret that so stupendous a blunder had been made as that of acquiring the undertaking.

Kingsbridge Water Supply.—As a condition of their consent to the scheme which is proposed for the water supply of Kingsbridge, the Local Government Board have intimated that it will be necessary for the District Council to purchase or lease a large farm situated immediately above the springs from which it is proposed to obtain the water. In the opinion of the Board's advisers, it is necessary, in order to obviate the risk of pollution, for the Council to effectually divert the farm drainage, and prevent the manuring at any time of the land surrounding the springs. It was decided that the Clerk should reply that the Council did not see how it was possible for them to carry out the wishes of the Board. The Chairman (Mr. J. S. Hurwell) said it meant that the Provisional Order was knocked on the head, and there was no chance of getting a better supply of water this year.

The Working of the Gas and Water Departments at Middlesbrough.—At Tuesday's meeting of the Middlesbrough Town Council, Alderman Wilson, in presenting the yearly budget, said that the rates levied last year did not meet the expenditure by £9000 or £10,000; and this amount had to be provided for in the forthcoming year's rates. This arose from several causes, and might have been avoided if the various Committees had not carried out work for which they had not prepared any estimates. For instance, there was a loss of income from the gas-works due to the increase in the price of coals for two-thirds of the gas produced and of oil in manufacturing the other third of water gas. They expected £1000 more from the gas-works than they had estimated a year ago. The gas-works had failed last year in producing the profit estimated; but woe betide them if they disappointed them again this year. (Laughter.) They also expected £5000 more from the Water Board than they estimated last year to receive; and if this amount was secured, it would pay within ¼ per cent. of the interest and redemption. The rate would be 2¼d. in the pound for water, instead of 8d. as last year (reduced to 6d. because of a balance brought forward). The upshot was that the borough rate, instead of being 3s. 1d., would be 2s. 10d.; and the district rate 3s. 6d., instead of 3s. 8d.

JOSEPH AIRD
GREAT-BRIDGE.
STAFFORDSHIRE.
TUBES
AND FITTINGS
Illustrated Price Lists on Application.
LONDON OFFICES: 46, QUEEN VICTORIA STREET, E.C.

Hamburg Water Supply.—With a view to supplementing the existing water supply from underground sources, the Hamburg Senate propose voting a sum of 320,000 marks for carrying out a series of experimental borings.

Suffocated in a Gas-Producer.—A fatal accident of a very unusual kind occurred last Tuesday on the premises of Messrs. John Brown and Co., Limited, of Brightside, Sheffield. A man named Donald Bain, of 66, Sedan Street, was employed in the portion of the works situated in Kenninghall Street, away from the main works. It was his duty to clean the tubes, flues, &c., of the gas-producer at work there. As nothing had been seen of Bain for some time on Tuesday afternoon, a search was made, and his dead body was eventually discovered in one of the tubes of a gas-producer which was not in use at the time. It is surmised that he was cleaning the tar drippings from the tubes when he was overcome by the fumes from the producer, and that, becoming unconscious, he was eventually suffocated. The deceased was a widower; and he leaves one child, a little girl, aged twelve years.

The Manchester Gas Committee and the Manufacture of Bye-Products.—A deputation from the Manchester and Salford Sanitary Association waited upon the Manchester Corporation Gas Committee last Friday for the purpose of urging the Committee to undertake themselves the manufacture of gas bye-products. The deputation consisted of Professor Leech, Professor Dixon Mann, Mr. W. Thomson, Dr. Hamil, the Rev. S. N. Perry, and Mr. F. Scott. The Committee were asked to take up the manufacture with a view to its being carried on with the least possible detriment to the public health, and so obviate the bitter complaints which have been made for a long time in the Miles Platting district, where there are works conducted by private firms. It was also pointed out that, by manufacturing these products themselves, the Corporation would gain pecuniarily. The health aspect of the question was particularly emphasized by the speakers; and one argument advanced was that by making a profit out of the manufacture, the Committee would the more easily be able to reduce the price of gas to say 2s. per 1000 cubic feet. At this price it would compete successfully with coal as a motive power for engines and for other purposes. By a more general use of gas as motive power, there would be a greater improvement in the atmosphere of Manchester. Alderman Gibson, the Chairman of the Gas Committee, replying to the deputation, said the Committee had already undertaken the manufacture of their own ammoniacal liquor. He expressed pleasure at having the views of such an important Association laid before the Committee, and assured the deputation that as far as possible their wishes would be carried out.

Swansea Gas Company.—The annual meeting of this Company was held last Friday week. In their report, the Directors recommended the declaration of the authorized dividends of 10, 7½, and 7 per cent. upon the various classes of shares, and 5 per cent. upon the new 1898 stock. A sum of £2388 was carried forward as balance, or about £570 less than was brought forward from the previous half year. This was attributable to extra expense incurred in resheeting a gasholder. Notwithstanding the fine weather which had ensued during the past six months, and the constant increase of empty houses in Swansea, the sales of gas showed a rise of 3½ per cent.; and this was chiefly due to the meter consumption of gas by the prepayment system. The number of coin meters fixed during the past six months was 1550; and the Company had an average of 1200 consumers per annum still applying to be laid on. The Directors also stated that the conversion of the share capital into consolidated stock had been satisfactorily carried through. They were about to erect large purifiers and buildings to meet the requirements of increasing consumers. The Board further paid a tribute of respect to their late colleague Mr. Thomas Phillips, who had been a Director, Vice-Chairman, and Chairman for 37 years. The Chairman (Mr. T. T. Wood) said he looked forward to a very large increase from the coin meters. The Company were seeking to meet the requirements as quickly as the demand arose; and this entailed labour and expense. They would shortly have to issue new capital in order to meet the growing demand. They had been slightly affected by the coal strike, as had nearly every gas company in the kingdom; but this had been in some measure met by the extra price received for the bye-products. Taking all the circumstances into consideration, the half year was a very satisfactory one. He added that by the conversion of the shares into consolidated stock, there was a gain to the shareholders of about £7 10s. on the market value. The report was adopted.

Messrs. Clayton, Son, and Co., Limited, of Leeds, have obtained an order for 32 tar-vessels for the Halifax Gas-Works.

The Town Council at Llanidloes have selected, out of twelve tenders for carrying out the water-works there, that of Mr. J. Jones Meredith, for £6896. The highest tender was for £14,628.

Messrs. Biggs, Wall, and Co. have received an order from Mr. R. G. Shadbolt, Engineer and Secretary of the Grantham Gas-Works, for one of their "Rapid" manual charging-machines.

Messrs. W. C. Holmes and Co., of Huddersfield, have received an order from the Burgh Commissioners of Wishaw for the supply of four 20-feet square purifiers, connections, centre-valve, &c., for erection at the Wishaw Gas-Works.

The annual meeting of shareholders of James Milne and Son, Limited, was held last Friday when a dividend at the rate of 6 per cent. was declared on the preference and ordinary shares, and of 20 per cent. on the deferred shares.

At a meeting of representatives of the fire-clay trade, held at Stourbridge last Tuesday, it was unanimously agreed that, in consequence of the rise in the value of fuel and other materials, the price of fire-bricks should be advanced from that date 2s. 6d. per 1000; fire-clay, 1s. per ton; and retorts and all other goods, 10 per cent.

The first award at the recent exhibition of gas appliances held at the Exhibition at Auckland (N.Z.), which we understand to be the most important ever held in that country, was obtained by Messrs. Fletcher, Russell, and Co., Limited, for the general excellence of design and economy of their numerous patterns of gas cooking and heating appliances.

Last Thursday morning, the glass warehouse of Messrs. J. & W. B. Smith, in the Farringdon Road, was destroyed by fire; and the adjacent show-rooms and offices of Messrs. Henry Greene and Sons, Limited, were necessarily placed in jeopardy. Fortunately, however, the firemen were successful in saving the premises from the flames; but they were much damaged by water, though not to such an extent as to interfere with the business.

The following exhibitions of gas appliances have lately been held: By the Davis Gas-Stove Company, Limited, at St. Andrew's, with lectures by Miss M. E. Betts. By Messrs. Fletcher, Russell, and Co., Limited, at Guildford, with lectures by Miss R. Brown. By Messrs. R. & A. Main, Limited, at Airdrie and Uddingston, with lectures by Miss Young. Messrs. Richmond and Co., Limited, opened an exhibition at Ramsgate yesterday, with cookery lectures by Miss Stansfield.

The New Incandescent (Sunlight) Gas Lighting Company, Limited, is to be reconstructed with a capital of £200,000, in £1 shares. The scheme was put before the shareholders at an extraordinary general meeting held on Monday last week, when the Chairman (Mr. J. H. H. Duncan) explained that under the new scheme the Company's capital would be inside £185,000, and the shares issued would have 15s. paid for what the present shareholders gave 20s. This would wipe off the loss in past trading, and enable them to start on a fresh basis, which would be sound. The Directors proposed to call up only 1s. at once. The Directors and the Committee of Investigation were unanimous in favour of the scheme; and it was sanctioned by the shareholders.

Among recent sales, the following may be noted: At Newcastle-upon-Tyne last Wednesday, Mr. R. Mack sold £25,000 worth of ordinary stock of the Newcastle-on-Tyne and Gateshead Gas Company, entitled to 9½ per cent. dividend. It was put up in £100 lots, and the lowest price realized was £223 10s.; the highest, £228; and the average, £225 7s. 6·96d. The total amount produced by the sale was £56,344 15s. On the previous day, Messrs. Kidwell and Son held an auction sale at Chatham, when fifteen £10 "B" shares in the Sheppey Gas Company were offered, on which a dividend of 10 per cent. has always been paid. Two shares fetched £25 each; the rest being disposed of at £23 per share. Five £10 "C" shares in the same Company, upon which 7 per cent. has been paid, were sold for £15 10s. apiece. The next offered were three £20 shares in the Sittingbourne District Gas Company, which were sold at £33 10s. each. The sum of £237 was paid for £102 of consolidated "B" stock in the Canterbury Gas and Water Company. In 1898 the dividend on the latter was 9 per cent. per annum. On Monday last week, Messrs. Coombes sold by auction 19 original shares, of the nominal value of £12 10s. each, on which 9 per cent. is being paid, in the Ryde Gas Company. Eight fetched £27, and the remainder £27 5s. each; the total amount realized being £515 15s.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

ANDREW STEPHENSON,
182, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.
Telegrams: "Volcanism, London."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SEASON 1899.

BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.
FIRE CEMENT, PAINT, and CHEMICALS.
120 and 121, NEWGATE STREET, LONDON, E.C.

TO GAS AND WATER OFFICIALS.

CYCLES of the Highest Quality at reasonable Prices. Catalogue, post free. For CASH, or on GRADUAL PAYMENT SYSTEM. *Sent on approval. Twelve Months' Guarantee.*
MELROSE CYCLE COMPANY, COVENTRY.

Price 2s., Post Free.

STEPHEN CARPENTER, on the Purification of Coal Gas by Lime, Oxide of Iron, and Atmospheric Air, and the Method of Working Purifiers so that the Lime may be used a second time, with a Description of Carpenter's short Method of Working off the Sulphur Test, and Table for Calculating Results.
S. CARPENTER, Ryde House, 28, Woodhouse Grove, East Ham, ESSEX.

The Ossett Gas-Works Purchase.—At a statutory meeting of the Ossett Town Council held last Wednesday evening the Mayor (Mr. F. L. Fothergill) presiding—a resolution was submitted for the promotion in Parliament, either alone or in conjunction with the Horbury District Council, of a Bill for the purchase, compulsorily or otherwise, of the undertaking, works, and plant, of the Ossett Gas Company, and for powers to borrow money in connection therewith. Nine members voted for the resolution, one against it, and four (including a Director of the Company) were neutral. The resolution was consequently carried.

River Plate Gas Company, Limited.—At the second annual general meeting of this Company next Thursday, the Directors will report a total profit for the year ending Dec. 31, of £110,636, as compared with £80,662 in the preceding twelve months. Adding to the first-named sum the amount brought forward (£10,967), there is produced a total of £121,603. After payment of all fixed charges, making allowance for bad and doubtful debts, and providing fully for the maintenance of the works, mains, &c., there remains to be dealt with the sum of £100,461. Out of this the interim dividend at the rate of 6 per cent. per annum (free of income-tax), amounting to £25,532, was paid in October last; and the Directors recommend the appropriation of the balance as follows: To the reserve fund (raising it to £40,000), £20,000; to a special contingency fund, £10,000; and the payment of a final dividend for the year at the rate of 8s. per share, making 7 per cent. for the year (free of income-tax), £34,043—leaving a balance of £10,886 to be carried forward. During the past year, the sum of £21,029 was spent out of revenue on the upkeep of the works and mains, &c. A complete installation of automatic charging and drawing machinery has been erected at the Corrales works, and has given entire satisfaction. The mains were increased last year to the extent of about 10 miles; and 1600 new house services were connected with the Company's system.

The Bolton Corporation Water-Works Undertaking.—The Bolton Corporation having made application to the Local Government Board for sanction to borrow £1600 and £4500 for improvements in connection with their water-works undertaking, two Inspectors for the Department (Mr. P. H. Bagenal and Dr. Buchanan) attended at the Bolton Town Hall on Friday to hear evidence on the matter. The Town Clerk (Mr. R. G. Hinnell) explained that the £1600 was required to purchase a small estate situate on the north-westerly side of the Corporation's reservoir at Entwistle; and the object in securing it was to protect the water from pollution. He added that they had, by a Provisional Order of 1894, power to borrow £100,000 for the purpose of purchasing lands within their watershed area, subject to the sanction of the Local Government Board; and of this sum £81,769 had been obtained and expended. Up to the present the Corporation had acquired 1785 acres within their gathering-ground; and on these lands there were 36 houses. Extra precautions had been taken to prevent pollution from these buildings. Replying to Dr. Buchanan, the Water Engineer (Mr. R. H. Swindlehurst) said the total population supplied with water was upwards of 271,000; the Corporation being under contract to serve a number of townships beyond the borough limits. The £4500 was required to complete the filtration works at the Belmont reservoirs. There was no opposition to the application.

Huddersfield Corporation Stock.—The Huddersfield Corporation last Tuesday decided to create an additional amount of stock to the extent of £600,000. Of this large sum, £290,485 is required for the reduction of the existing water-works loans and further extensions; and £293,715 for the "borrowing fund," including electricity supply, reduction of existing loans, and further extensions.

The Yeovil Gas-Works Purchase.—At the meeting of the Yeovil Town Council on Monday last week, the Finance Committee recommended that the amounts required for paying the costs of the Yeovil Corporation Act, 1898, and for purchasing the gas-works be raised by loans from the Public Works Loan Commissioners; the first being raised at 2¾ per cent., and the second at 3 per cent. interest. Mr. Hack expressed the opinion that the Committee had not estimated for a sufficient amount, in view of probable improvements. The recommendations were adopted. Messrs. Pittard, Raymond, Petter, Johnson, and Watts were elected as the Gas Committee. Mr. Hack drew attention to the award in connection with the purchase of the gas-works, and expressed regret that so stupendous a blunder had been made as that of acquiring the undertaking.

Kingsbridge Water Supply.—As a condition of their consent to the scheme which is proposed for the water supply of Kingsbridge, the Local Government Board have intimated that it will be necessary for the District Council to purchase or lease a large farm situated immediately above the springs from which it is proposed to obtain the water. In the opinion of the Board's advisers, it is necessary, in order to obviate the risk of pollution, for the Council to effectually divert the farm drainage, and prevent the manuring at any time of the land surrounding the springs. It was decided that the Clerk should reply that the Council did not see how it was possible for them to carry out the wishes of the Board. The Chairman (Mr. J. S. Hurwell) said it meant that the Provisional Order was knocked on the head, and there was no chance of getting a better supply of water this year.

The Working of the Gas and Water Departments at Middlesbrough.—At Tuesday's meeting of the Middlesbrough Town Council, Alderman Wilson, in presenting the yearly budget, said that the rates levied last year did not meet the expenditure by £9000 or £10,000; and this amount had to be provided for in the forthcoming year's rates. This arose from several causes, and might have been avoided if the various Committees had not carried out work for which they had not prepared any estimates. For instance, there was a loss of income from the gas-works due to the increase in the price of coals for two-thirds of the gas produced and of oil in manufacturing the other third of water gas. They expected £1000 more from the gas-works than they had estimated a year ago. The gas-works had failed last year in producing the profit estimated; but woe betide them if they disappointed them again this year. (Laughter.) They also expected £5000 more from the Water Board than they estimated last year to receive; and if this amount was secured, it would pay within ¼ per cent. of the interest and redemption. The rate would be 2¼d. in the pound for water, instead of 8d. as last year (reduced to 6d. because of a balance brought forward). The upshot was that the borough rate, instead of being 3s. 1d., would be 2s. 10d.; and the district rate 3s. 6d., instead of 3s. 8d.

JOSEPH AIRD
GREAT-BRIDGE.
STAFFORDSHIRE.
TUBES
AND FITTINGS
Illustrated Price Lists on Application.
LONDON OFFICES: 46, QUEEN VICTORIA STREET, E.C.

Hamburg Water Supply.—With a view to supplementing the existing water supply from underground sources, the Hamburg Senate propose voting a sum of 320,000 marks for carrying out a series of experimental borings.

Suffocated in a Gas-Producer.—A fatal accident of a very unusual kind occurred last Tuesday on the premises of Messrs. John Brown and Co., Limited, of Brightside, Sheffield. A man named Donald Bain, of 66, Sedan Street, was employed in the portion of the works situated in Kenninghall Street, away from the main works. It was his duty to clean the tubes, flues, &c., of the gas-producer at work there. As nothing had been seen of Bain for some time on Tuesday afternoon, a search was made, and his dead body was eventually discovered in one of the tubes of a gas-producer which was not in use at the time. It is surmised that he was cleaning the tar drippings from the tubes when he was overcome by the fumes from the producer, and that, becoming unconscious, he was eventually suffocated. The deceased was a widower; and he leaves one child, a little girl, aged twelve years.

The Manchester Gas Committee and the Manufacture of Bye-Products.—A deputation from the Manchester and Salford Sanitary Association waited upon the Manchester Corporation Gas Committee last Friday for the purpose of urging the Committee to undertake themselves the manufacture of gas bye-products. The deputation consisted of Professor Leech, Professor Dixon Mann, Mr. W. Thomson, Dr. Hamil, the Rev. S. N. Perry, and Mr. F. Scott. The Committee were asked to take up the manufacture with a view to its being carried on with the least possible detriment to the public health, and so obviate the bitter complaints which have been made for a long time in the Miles Platting district, where there are works conducted by private firms. It was also pointed out that, by manufacturing these products themselves, the Corporation would gain pecuniarily. The health aspect of the question was particularly emphasized by the speakers; and one argument advanced was that by making a profit out of the manufacture, the Committee would the more easily be able to reduce the price of gas to say 2s. per 1000 cubic feet. At this price it would compete successfully with coal as a motive power for engines and for other purposes. By a more general use of gas as motive power, there would be a greater improvement in the atmosphere of Manchester. Alderman Gibson, the Chairman of the Gas Committee, replying to the deputation, said the Committee had already undertaken the manufacture of their own ammoniacal liquor. He expressed pleasure at having the views of such an important Association laid before the Committee, and assured the deputation that as far as possible their wishes would be carried out.

Swansea Gas Company.—The annual meeting of this Company was held last Friday week. In their report, the Directors recommended the declaration of the authorized dividends of 10, 7½, and 7 per cent. upon the various classes of shares, and 5 per cent. upon the new 1898 stock. A sum of £2388 was carried forward as balance, or about £570 less than was brought forward from the previous half year. This was attributable to extra expense incurred in resheeting a gasholder. Notwithstanding the fine weather which had ensued during the past six months, and the constant increase of empty houses in Swansea, the sales of gas showed a rise of 3¼ per cent.; and this was chiefly due to the meter consumption of gas by the prepayment system. The number of coin meters fixed during the past six months was 1550; and the Company had an average of 1200 consumers per annum still applying to be laid on. The Directors also stated that the conversion of the share capital into consolidated stock had been satisfactorily carried through. They were about to erect large purifiers and buildings to meet the requirements of increasing consumers. The Board further paid a tribute of respect to their late colleague Mr. Thomas Phillips, who had been a Director, Vice-Chairman, and Chairman for 37 years. The Chairman (Mr. T. T. Wood) said he looked forward to a very large increase from the coin meters. The Company were seeking to meet the requirements as quickly as the demand arose; and this entailed labour and expense. They would shortly have to issue new capital in order to meet the growing demand. They had been slightly affected by the coal strike, as had nearly every gas company in the kingdom; but this had been in some measure met by the extra price received for the bye-products. Taking all the circumstances into consideration, the half year was a very satisfactory one. He added that by the conversion of the shares into consolidated stock, there was a gain to the shareholders of about £7 10s. on the market value. The report was adopted.

Messrs. Clayton, Son, and Co., Limited, of Leeds, have obtained an order for 32 tar-vessels for the Halifax Gas-Works.

The Town Council at Llanidloes have selected, out of twelve tenders for carrying out the water-works there, that of Mr. J. Jones Meredith, for £6896. The highest tender was for £14,628.

Messrs. Biggs, Wall, and Co. have received an order from Mr. R. G. Shadbolt, Engineer and Secretary of the Grantham Gas-Works, for one of their "Rapid" manual charging-machines.

Messrs. W. C. Holmes and Co., of Huddersfield, have received an order from the Burgh Commissioners of Wishaw for the supply of four 20-feet square purifiers, connections, centre-valve, &c., for erection at the Wishaw Gas-Works.

The annual meeting of shareholders of James Milne and Son, Limited, was held last Friday when a dividend at the rate of 6 per cent. was declared on the preference and ordinary shares, and of 20 per cent. on the deferred shares.

At a meeting of representatives of the fire-clay trade, held at Stourbridge last Tuesday, it was unanimously agreed that, in consequence of the rise in the value of fuel and other materials, the price of fire-bricks should be advanced from that date 2s. 6d. per 1000; fire-clay, 1s. per ton; and retorts and all other goods, 10 per cent.

The first award at the recent exhibition of gas appliances held at the Exhibition at Auckland (N.Z.), which we understand to be the most important ever held in that country, was obtained by Messrs. Fletcher, Russell, and Co., Limited, for the general excellence of design and economy of their numerous patterns of gas cooking and heating appliances.

Last Thursday morning, the glass warehouse of Messrs. J. & W. B. Smith, in the Farringdon Road, was destroyed by fire; and the adjacent show-rooms and offices of Messrs. Henry Greene and Sons, Limited, were necessarily placed in jeopardy. Fortunately, however, the firemen were successful in saving the premises from the flames; but they were much damaged by water, though not to such an extent as to interfere with the business.

The following exhibitions of gas appliances have lately been held: By the Davis Gas-Stove Company, Limited, at St. Andrew's, with lectures by Miss M. E. Betts. By Messrs. Fletcher, Russell, and Co., Limited, at Guildford, with lectures by Miss R. Brown. By Messrs. R. & A. Main, Limited, at Airdrie and Uddingston, with lectures by Miss Young. Messrs. Richmond and Co., Limited, opened an exhibition at Ramsgate yesterday, with cookery lectures by Miss Stansfield.

The New Incandescent (Sunlight) Gas Lighting Company, Limited, is to be reconstructed with a capital of £200,000, in £1 shares. The scheme was put before the shareholders at an extraordinary general meeting held on Monday last week, when the Chairman (Mr. J. H. H. Duncan) explained that under the new scheme the Company's capital would be inside £185,000, and the shares issued would have 15s. paid for what the present shareholders gave 20s. This would wipe off the loss in past trading, and enable them to start on a fresh basis, which would be sound. The Directors proposed to call up only 1s. at once. The Directors and the Committee of Investigation were unanimous in favour of the scheme; and it was sanctioned by the shareholders.

Among recent sales, the following may be noted: At Newcastle-upon-Tyne last Wednesday, Mr. R. Mack sold £25,000 worth of ordinary stock of the Newcastle-on-Tyne and Gateshead Gas Company, entitled to 9½ per cent. dividend. It was put up in £100 lots, and the lowest price realized was £223 10s.; the highest, £228; and the average, £225 7s. 6·96d. The total amount produced by the sale was £56,344 15s. On the previous day, Messrs. Kidwell and Son held an auction sale at Chatham, when fifteen £10 "B" shares in the Sheppey Gas Company were offered, on which a dividend of 10 per cent. has always been paid. Two shares fetched £25 each; the rest being disposed of at £23 per share. Five £10 "C" shares in the same Company, upon which 7 per cent. has been paid, were sold for £15 10s. apiece. The next offered were three £20 shares in the Sittingbourne District Gas Company, which were sold at £33 10s. each. The sum of £237 was paid for £102 of consolidated "B" stock in the Canterbury Gas and Water Company. In 1898 the dividend on the latter was 9 per cent. per annum. On Monday last week, Messrs. Coombes sold by auction 19 original shares, of the nominal value of £12 10s. each, on which 9 per cent. is being paid, in the Ryde Gas Company. Eight fetched £27, and the remainder £27 5s. each; the total amount realized being £515 15s.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

ANDREW STEPHENSON,
182, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

Telegrams: "Volcanism, London."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SEASON 1899.

BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.
FIRE CEMENT, PAINT, and CHEMICALS.
120 and 121, NEWGATE STREET, LONDON, E.C.

TO GAS AND WATER OFFICIALS.

CYCLES of the Highest Quality at reasonable Prices. Catalogue, post free. For CASH, or on GRADUAL PAYMENT SYSTEM. *Sent on approval. Twelve Months' Guarantee.*
MELROSE CYCLE COMPANY, COVENTRY.

Price 2s., Post Free.

STEPHEN CARPENTER, on the Purification of Coal Gas by Lime, Oxide of Iron, and Atmospheric Air, and the Method of Working Purifiers so that the Lime may be used a second time, with a Description of Carpenter's short Method of Working off the Sulphur Test, and Table for Calculating Results.
S. CARPENTER, Ryde House, 28, Woodhouse Grove, East Ham, ESSEX.

SADLER & CO., Ld., Middlesbrough; Ulverston (Barrow); Portsmouth; Carlton (N.E.R.); and Stockton. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "Sadler, Middlesbrough."

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, St. Andrew Square, Edinburgh, } Scotland. Newton Grange, Newbattle, Dalkeith, }

BROTHERTON & CO.
Offices: Commercial Buildings, Leeds.
Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "Porter Lincoln."
[For Illustrated Advertisement, see April 4, p. 883.]

HUTCHINSON BROS. & CO, Ltd., Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 948, last week's issue.)
Telegrams: "Hutchinson Bros., Barnsley."

SULPHURIC ACID for Sale.
Brotherton and Co., Chemical Manufacturers.
Works: Birmingham, Leeds, and Wakefield.

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

PATENTS FOR INVENTIONS.
Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, Chancery Lane, London, W.C.

AMMONIACAL LIQUOR wanted.
Brotherton and Co., Ammonia Distillers.
Works: Birmingham, Leeds, and Wakefield.

IMPORTANT.

REPAIR your old Retorts with Patent STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Estimates for all kinds of Retort-Settings.
Write Crowther, Retort Setter, and Sole Maker of Stickfast Fire Cement, Manor Street, Huddersfield.

GAS TAR wanted.
Brotherton and Co., Tar Distillers.
Works: Birmingham, Leeds, and Wakefield.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., Central Plumbing Works, Town Hall Square, Bolton. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "Saturators, Bolton."

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the Brimington Carbon Company, Bowerby Bridge, Yorks.

SPENT OXIDE wanted.
Brotherton and Co., Chemical Manufacturers.
Works: Birmingham, Leeds, and Wakefield.

PRACTICAL RETORT SETTER.

GEORGE NUTTALL, 32, Havelock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

TO GAS COMPANIES AND MANAGERS.

A GAS Manager's Son (age 19) is desirous of obtaining a Situation as IMPROVER in Gas-Fitting, Main and Service laying, and the general routine of a Gas-Works Fitter.
Address No. 3247, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

TRAVELLERS who are continually calling at Gas-Works are invited to communicate with Advertiser, who wishes to make arrangements with them to purchase Gas Retort Carbon on commission.
Apply, by letter, to No. 3246, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GLAZIER wanted. Only those need apply who are accustomed to Public Street Lamps. Permanent work for suitable Man.
S. Pontifex and Co., 22, Coleman Street, London, E.C.

STOKER wanted for small Country Gas-Works, where Exhauster and Engine are used. Wages 22s. Permanent job for a good man.
Apply, with References as to Character, &c., to the Manager, Gas-Works, Kingsbridge, Devon.

TWO General Foremen required at large and medium Gas-Works respectively. Age about 30. Good mechanical training, and knowledge of Gas Plant generally, essential.
For further Particulars, apply, by letter, to No. 3248, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, a First-class Draughtsman, accustomed to designing Buildings and Apparatus for Gas-Works, and making up Schedules.
Apply, by letter, with Testimonials, giving previous Experience and Salary required, to No. 3245, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, two Retort-House Fitters for Gas-Works in London. Applicants must be under 40 Years of Age. Good Wages and permanent employment for capable Men of good character.
Apply, by letter, to No. 3239, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, two Carbonizing Foremen, accustomed to Regenerative Furnaces and Inclined Retorts.
Apply, by letter, enclosing *copies* of three recent Testimonials as to Character and Abilities, to No. 3227, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, a Gas-Fitter to fit Houses for Prepayment Meters and Fittings, and to make himself generally useful on the District. Wages 30s. per week.
Apply, giving full Particulars as to Age and Experience, to Mr. A. H. Godwin, Manager, Gas-Works, Watford.

WANTED, two Carbonizing Foremen. Must have a knowledge of Regenerator Furnaces and Machinery.
Apply, stating Age, Experience, and Wages required, with *copies* of two Testimonials as to character, to the Manager, Gas-Works, Peterborough.
April 13, 1899.

WANTED, a Junior Clerk. Must be efficient in Shorthand, and have had experience in Gas and Water Office.
Applications, in own Handwriting, with not more than Three Testimonials, to be sent to my Office not later than the 26th of April. Salary £50 per annum.
By order,
Reginald W. Edwards,
Secretary.
Gas and Water Offices,
Aldershot.

LONGTON CORPORATION GAS-WORKS.

THE Gas Committee invite applications for the post of MANAGER of their Gas-Works. The person appointed will have the control and management of the Works; but the whole of the clerical work in connection with the Department will be undertaken by the Secretary and Office Staff. The Engagement will be subject to Three Months' Notice to terminate the same at any time. The Manager will be required to devote the whole of his time to the discharge of the duties of his Office, and to provide a Guarantee, in an approved Guarantee Society, in the sum of £500 for faithful services. Preference will be given to anyone having a knowledge of the management of a Joint Gas and Electric Light Undertaking.
Salary £250 per annum.
Canvassing strictly prohibited.
Applications, endorsed "Gas Manager," stating Age, Experience, present Employment, &c., accompanied by *copies* of not more than three recent Testimonials, to be sent in to the undersigned on or before the 11th day of May, 1899.
Geo. C. Kent,
Town Clerk.
Town Clerk's Office, Court House,
Longton, April 14, 1899.

LONGTON CORPORATION GAS-WORKS.

THE Gas Committee invite applications for the post of SECRETARY and CASHIER of their Gas-Works. The person appointed will have to devote the whole of his time to the discharge of the duties of his Office, and will be responsible for the management and superintendence of the whole of the Office staff in connection with the Department. He will be required to provide a guarantee in an approved Guarantee Society in the sum of £500 for faithful services.
Salary £150 per annum.
Canvassing strictly prohibited.
Applications, endorsed "Gas Secretary and Cashier," stating Age, Experience, and present Employment, accompanied by *copies* of not more than three recent Testimonials, to be sent in to the undersigned on or before the 11th day of May, 1899.
Geo. C. Kent,
Town Clerk.
Town Clerk's Office, Court House,
Longton, April 14, 1899.

WANTED, immediately, two 12 feet Square PURIFIERS in good condition, with Seives complete. Also 20,000 Cubic Feet ENGINE and EXHAUSTER.
Apply, by letter, to No. 3244, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

THE Dronfield Gaslight and Coke Com-pany are in want of a second-hand METER TEST HOLDER, in good condition.
For further Particulars, apply to the Manager, Mr. Thomas B. Jones.

BOROUGH OF WOKINGHAM.

WANTED, a Set of three or four second-hand PURIFIERS, 10 or 12 feet square, with Lifting Gear complete. Must be in good condition.
Price and full Particulars to the Manager and Secretary, Gas Office, Wokingham, Berks.

FOR SALE—A small high class Gas-EXHAUSTER, with Engine combined. Perfectly new. Others in progress.
Sellers Pickering and Co., Gas Engineers, Ravensthorpe, Yorks.

FOR SALE—A Village Gas-Works com-plete. A Working Manager with moderate Capital would find in this a good Investment and comfortable Home.
Address No. 3243, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. Blakeley, Gas Engineer, Thornhill, Dewsbury.

FOR SALE, cheap—
Two PURIFIERS, 8 ft. square by 4 ft. deep.
Two " 5 ft. " 4 ft. "
One " 5 ft. " 3 ft. "
One EXHAUSTER, 20,000 Cubic Feet per hour.
Two " 5000 " " "
Also CONDENSERS, SCRUBBERS, WASHERS, GASHOLDERS and TANKS, VALVES, &c., &c.
Apply to Saml. While and Son, 60, Queen Victoria Street, London, E.C.

IMPROVED WATER-METER.

VALUABLE PATENT RIGHTS FOR SALE.

MESSRS. CRUIKSHANK AND FAIR-WEATHER, 62, St. Vincent Street, Glasgow, are open to treat for the SALE of HALLBERG'S BRITISH PATENT No. 5119/98, and also the corresponding GERMAN, AUSTRIAN, and UNITED STATES PATENTS.

GAS Plant for Sale, cheap to clear—
RETORT IRONWORK, several good Sets.
Six-inch VERTICAL PIPE CONDENSER complete.
Four ANNULAR CONDENSERS, 32 in. by 18 ft.
EXHAUSTERS and ENGINES, several good Sets.
TOWER SCRUBBERS, 5ft. by 20ft., 5ft. by 40ft., & others.
PURIFIERS from 5 ft. square to 12 ft. square.
STATION METERS and GOVERNORS.
GASHOLDERS, 35 ft. by 14 ft. & 50 ft. by 18 ft., perfect.
VALVES of all kinds in Stock.
IRON STORAGE TANKS.
J. Firth Blakeley & Co., Thornhill, Dewsbury.

SKIBBEREEN GASLIGHT AND COKE COMPANY, LIMITED, SKIBBEREEN, CO. CORK.

TENDERS wanted for Gasholder, 40 ft. by 12 ft. Tenders to be sent in before the 1st of May next.
Acceptance of the lowest or any Tender not guaranteed.

CITY OF LEEDS.
(Gas Department.)

TENDERS required as below—
For CAST-IRON PIPES, BENDS, TEES, SYPHON WELLS, and other IRREGULAR PIPES.
For 2½-inch, 3-inch, and 4-inch Self-Faced BRADFORD or HALIFAX FLAGS.
For RETORT MOUTHPIECES, STAND-PIPES, DOOR-FRAMES, SPECIAL BENDS, TEES, FLANGE PIPES, SADDLES, BELTS, PLUGS, and CAPS, SYPHON COVERS, &c.
Samples may be seen on application at the Stores Department, 21, Dewsbury Road, Leeds, and Forms of Tender and Specification may be had on application to the undersigned.
Endorsed Tenders, addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, will be received not later than Tuesday, the 25th inst.
The Committee do not bind themselves to accept the lowest or any Tender.
R. H. Townsley,
General Manager.
Municipal Offices, Leeds,
April 14, 1899.

CITY OF LEEDS.
(Gas Department.)

THE Gas Committee of the Leeds City Council are prepared to receive TENDERS for the construction and erection, at the New Wortley Gas-Works, of a CAST-IRON WATER-CISTERN, 40 feet square by 6 feet deep.
Plans and Specification may be seen, and Bills of Quantities obtained, on application to the undersigned.
Tenders, endorsed "Water-Cistern," and addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, will be received not later than Monday, the 24th inst.
The Committee do not bind themselves to accept the lowest or any Tender.
R. H. Townsley,
General Manager.
Gas Offices, Municipal Buildings,
Leeds, April 14, 1899.

ULVERSTON URBAN DISTRICT COUNCIL.
(GAS AND WATER DEPARTMENT.)

TENDERS FOR CANNEL.

THE Gas and Water Committee invite TENDERS for the supply of CANNEL COAL for a term of One, Two, or Three Years commencing the 1st of July next.

Full Particulars and Forms of Tender may be had on application to the undersigned.

Sealed Tenders, endorsed "Tender for Cannel" must be sent addressed to the Chairman of the Gas and Water Committee not later than Thursday, the 27th inst.

JNO. SWAN,
Engineer and Manager.

ULVERSTON URBAN DISTRICT COUNCIL.

TO TAR DISTILLERS.

THE Gas and Water Committee invite TENDERS for the purchase of the surplus TAR produced at their Works during the Year commencing the 1st of July next.

Further Particulars and Forms of Tender may be had on application to the undersigned.

Sealed Tenders to be sent in not later than Thursday, the 27th inst., addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Tar."

The Committee do not bind themselves to accept the highest or any Tender.

JNO. SWAN,
Engineer and Manager.

URBAN DISTRICT COUNCIL OF BUXTON.

CONTRACT FOR TAR AND LIQUOR.

THE Urban District Council invite TENDERS for the purchase of the TAR and AMMONIACAL LIQUOR produced at their Works in Ashwood Dale, during One or more Years.

Particulars to be obtained of Mr. Geo. Smedley, Gas Department, Town Hall, Buxton.

The Council do not guarantee to accept the highest or any Tender.

Tenders, endorsed "Tender for Tar, &c.," to be addressed to the Chairman of the Gas Committee, and sent in not later than noon, on the 29th of April next.

By order,
JOSIAH TAYLOR,
Clerk to the Council.

Buxton, April 12, 1899.

TENDERS FOR COAL.

THE Urban District Council of Buxton invite TENDERS for the supply of about 4000 Tons of COAL per annum for One or more Years, to be delivered at their Siding on the Midland Railway in Ashwood Dale, Buxton.

Tenders, endorsed "Gas Coal," addressed to the Chairman of the Gas Committee, to be delivered at the Town Hall, not later than Noon on the 29th of April.

Forms of Tender and Particulars may be obtained of Mr. Geo. Smedley, Engineer, Gas Office, Town Hall, Buxton.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
JOSIAH TAYLOR,
Clerk.

Buxton, April 12, 1899.

FIRE-CLAY GOODS.

THE Urban District Council of Buxton invite TENDERS for the supply of FIRE-CLAY RETORTS, QUARRIES, BRICKS, and CLAY.

Forms of Tender and Particulars may be obtained of Mr. Geo. Smedley, Gas Office, Town Hall, Buxton.

Tenders, endorsed "Tender for Retorts, &c.," addressed to the Chairman of the Gas Committee, to be forwarded not later than noon, on the 29th of April.

By order,
JOSIAH TAYLOR,
Clerk.

Town Hall, Buxton,
April 12, 1899.

HINCKLEY URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE above Council are prepared to receive TENDERS for the supply and erection of FOUL MAIN and FOUR ANNULAR CONDENSERS.

Full Particulars may be obtained from Mr. Lee, Gas-Works, Hinckley.

The Council do not bind themselves to accept the lowest or any Tender.

Tenders to be sent in to the undersigned not later than Monday, May 1, 1899.

By order,
J. W. PRESTON,
Clerk.

FARNHAM GAS COMPANY, LIMITED.

TENDERS FOR COAL.

THE Directors of the Farnham Gas Company, Limited, are prepared to receive TENDERS from Persons willing to supply and deliver, free of all Dues and Charges, at the Farnham Station, London and South-Western Railway, 2400 Tons of the following descriptions of GAS COAL—viz., New Pelton, Pelaw Main, Aldwarke Main, or Strafford Silkstone—to be delivered in quantities of 50 Tons (at intervals) before the 31st of March, 1900. The Coals to be consigned to the order of the Farnham Gas Company, Limited, at the Farnham Railway Station.

In the case of Seaborne Coal, the Meter's Certificate of each quantity to be duly sent with invoice of same.

Payment monthly.

Sealed Tenders, marked "Tender for Coal," to be delivered to the Secretary, Mr. W. Wells, 112, West Street, Farnham, Surrey, not later than Eleven o'clock a.m., on Saturday, the 29th of April, 1899, of whom Forms of Tender may be obtained.

The Directors reserve the right to reject the lowest or any Tender.

April 8, 1899.

TENDERS FOR GAS COAL.

THE Directors of the Watford Gas and Coke Company invite TENDERS for the supply during the Twelve Months from the 1st day of July, 1899, to the 30th day of June, 1900, of 11,000 Tons (more or less) of GAS COAL (screened or unscreened), to be delivered at the Bushey Station of the London and North-Western Railway.

Forms of Tender and Information may be obtained on application (in writing only) of me the undersigned.

Tenders to be delivered on or before the 5th day of May, 1899, addressed to the Chairman of the Watford Gas and Coke Company, Watford, endorsed "Tenders for Gas Coal."

Tenders must be on the form supplied, any alteration of which will invalidate the Tender.

The Directors do not bind themselves to accept any Tender.

WILLIAM ROWELL,
Secretary.

Watford Gas and Coke Company's Offices,
Watford, April 14, 1899.

SHEFFIELD UNITED GASLIGHT COMPANY.

COKE-HOPPERS.

TO ENGINEERS, IRONFOUNDERS, AND CONTRACTORS.

THE Directors of this Company invite TENDERS for the supply, delivery, and erection of 30 COKE-HOPPERS for Retort-House at their Grimesthorpe Station.

Copy of the Drawing, with Specification and Form of Tender, may be obtained on application to the Engineer, Mr. Fletcher W. Stevenson, on payment of 10s. 6d. (not returnable).

Sealed Tenders, endorsed "Tender for Coke-Hoppers," must be delivered by post at the Company's Offices not later than the first post on Saturday, the 29th day of April.

The Directors do not bind themselves to accept the lowest or any Tender.

HANBURY THOMAS.
General Manager and Secretary.

Commercial Street, Sheffield,
April 15, 1899.

SHEFFIELD UNITED GASLIGHT COMPANY.

TO ENGINEERS, IRONFOUNDERS, &c.

THE Directors of this Company invite TENDERS for the supply and erection of a CAST-IRON TANK for Water and Liquor, 39 ft. 4 in. by 27 ft. 6 in. by 5 ft. 6 in. deep, together with Girders, Ladder, Landings, &c., at their Grimesthorpe Chemical Works.

Drawings may be seen and Specification, with Bill of Quantities, obtained, on application to the Engineer, Mr. Fletcher W. Stevenson, on payment of 10s. 6d., which will be returned on receipt of a *bonâ-fide* Tender.

Sealed Tenders, endorsed "Tender for Water and Liquor Tank," must be delivered by post to the undersigned at the Company's Offices not later than the first post on Saturday, April 29.

The Directors do not bind themselves to accept the lowest or any Tender.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
April 13, 1899.

BOROUGH OF MANSFIELD.
(GAS DEPARTMENT.)

THE Corporation are prepared to receive TENDERS for the supply and erection of Four 25 feet square by 5 ft. 6 in. PURIFIERS, complete with Staging, Lifting and Elevating Machinery, and 18-inch WECK'S PATENT CENTRE-VALVES complete.

The Plans may be seen, and Specifications and Forms of Tender obtained on deposit of £2 2s. from the undersigned.

The Deposit will be returned, after a contract has been entered into, to every person making a *bonâ-fide* Tender and on return of the documents entrusted to him. In the event of a Tender being withdrawn, the deposit will be forfeited.

Sealed Tenders, endorsed "Purifiers," on the Forms supplied, together with Specification, to be delivered at the Office of Mr. J. Harrop White, Deputy Town Clerk, Mansfield, before Twelve o'clock noon, Friday, the 28th of April, 1899.

The Corporation do not bind themselves to accept the lowest or any Tender.

The successful Contractor will be required to pay the Standard Rate of Wages.

ARTHUR GRAHAM,
Engineer and Manager.

Gas-Works, Mansfield,
April 7, 1899.

TENDERS FOR GAS COAL.

THE Brentwood Gas, Coke, and Light Company, Limited, invite TENDERS for the supply of about 4200 Tons of DURHAM GAS COAL, in Trucks at Brentwood Railway Station (G.E.R.), to be delivered in the following quantities the second week of each month: June, 140 tons; July, 160 tons; August, 300 tons; September, 500 tons; October, 500 tons; November, 500 tons; December, 510 tons; January, 500 tons; February, 350 tons; March, 300 tons; April, 250 tons; May, 190 tons.

TENDERS are also invited for 500 tons of SILKSTONE or other good INLAND COAL, in Trucks at Brentwood Railway Station (G.E.R.), to be delivered in the following quantities: September, 100 tons; October, 200 tons; November, 200 tons.

Tenders with Analysis of the Coal to be supplied, and Terms for monthly payments, to be sent to the undersigned, on or before the 29th inst.

Payments will only be made on the quantities delivered over the weighbridge belonging to the Great Eastern Railway Company at this Station.

Forms of Tender not supplied.

The Directors do not bind themselves to accept the lowest or any Tender.

C. A. FIELDER,
Secretary.

Brentwood, Essex,
April 8, 1899.

TO GASHOLDER MAKERS.

TENDERS are invited for the construction and erection of a small TWO-LIFT GASHOLDER.

Plans may be seen and Particulars obtained at the Shepley Gas-Works, near Huddersfield.

Tenders on Form supplied, endorsed "Tenders for Gasholder," must be sent to J. T. Chambers, Esq., Shepley, near Huddersfield, not later than April 29, 1899.

TO COLLIERY PROPRIETORS.

THE Directors of the Barnstaple Gas Company invite TENDERS for the supply of 3000 Tons of the very best GAS COALS, to be delivered as to 2000 Tons by the 1st of October next, and as to 1000 Tons by the end of December following. To be delivered at Framington Quay or at Barnstaple Station.

Tenders by the 1st of May next.

RICHARD ASHTON,
Secretary and Manager.

April 10, 1899.

THE Directors of the Kildwick Parish Gas Company invite TENDERS for the supply of the whole or part of 3500 Tons of GAS COAL or NUTS, to be delivered free in the Company's Sidings at Kildwick during the Twelve Months ending June 30, 1899.

Tenders to be sent in not later than April 29, 1899, to

FRED. H. PICKLES,
Manager and Secretary.

Gas-Works, Kildwick,
April 14, 1899.

CIRENCESTER GAS COMPANY, LIMITED.

THE Directors are prepared to receive TENDERS for the supply of from 2000 to 3000 Tons of GAS COAL, to be delivered free to the Watermoor Station of the Midland and South-Western Junction Railway Company during the ensuing Twelve Months in such quantities as may be ordered by the Manager.

Tenders, marked "Tender for Gas Coal," to be sent to the undersigned not later than May 2.

J. P. BEECHAM,
Secretary.

Gas Offices: 12, Silver Street,
Cirencester, April 12, 1899.

PETERBOROUGH GAS COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company invite TENDERS for the supply of screened GAS COAL, COBBLES, or NUTS for One Year, commencing the 1st of June, 1899.

Forms of Tender and Conditions may be obtained on application to the undersigned.

Tenders to be sent in by the 8th of May next, endorsed "Coal," and addressed to the Chairman of the Company.

The Directors do not bind themselves to accept the lowest or any Tender.

JOHN BARTON,
Secretary and Manager.

Gas-Works, Peterborough,
April 11, 1899.

BOROUGH OF BARROW-IN-FURNESS.

SUPPLY OF COAL AND CANNEL.

THE Corporation are prepared to receive TENDERS, on Forms to be obtained at the Office of the Gas and Water Manager, for the supply of screened GAS COAL and CANNEL, for the Year ending the 30th of June, 1900.

Tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Coal," to be delivered at the Town Clerk's Office not later than Twelve o'clock noon on Wednesday, the 26th day of April, 1899.

The lowest or any Tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Clerk's Office, Town Hall,
Barrow-in-Furness, April 14, 1899.

COUNTY BOROUGH OF BURY.

TO SULPHURIC ACID MAKERS.

THE Gas Committee of the Bury Corporation are prepared to receive TENDERS for the supply of about 400 Tons of SULPHURIC ACID for the Manufacture of Sulphate of Ammonia for a period of One Year from the 1st of May, 1899.

Forms of Tender and Conditions may be obtained on application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

Sealed Tenders, endorsed "Tender for Acid," to be sent to the undersigned on or before Monday, the 24th of April, 1899.

JOHN HASLAM,
Town Clerk.

Corporation Offices, Bank Street,
Bury, April 7, 1899.

TO COAL MERCHANTS, SHIPOWNERS, AND OTHERS.

THE Directors of the Torquay Gas Company are prepared to receive TENDERS for the supply, for One, Two, or Three Years, of about 14,000 Tons per annum (or such other quantity as may be agreed on) of best approved GAS COALS.

Tenders to state the price of the Coals, and the freight to Dartmouth or Torquay, separately and together, and also for delivery into the Company's Works, adjoining the Great Western Railway, free of all charges.

Further Particulars and Forms of Tender to be obtained from Mr. Beynon, the Manager of the Company, Hollacombe, Paignton; and Tenders to be sent to the undersigned before the 11th of May next.

JOHN KITSON,
Secretary.

Torquay, April 12, 1899.

THE Directors of the Harlow and Sawbridgeworth Gas Company are prepared to receive TENDERS for the supply of about 1000 Tons per annum, more or less, of first-class clean GAS COALS, delivered to their Siding, Harlow Station.

The deliveries per month through the Year to be in such proportion to the Total Quantity as the Company shall from time to time request in writing.

Tenders, to be sealed and marked "Tender," to be sent in on or before May 1 next to the Secretary, Mr. E. F. PARKER, HARLOW.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

£20,000

FOUR PER CENT. PERPETUAL DEBENTURE STOCK

OF THE

WEST HAM GAS COMPANY,

Offering to Trustees and others an Investment of the soundest character.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Monday, April 24, 1899, at Two o'clock, in Lots.

Particulars of the SECRETARY of the Company, at the Offices, Union Street, STRATFORD; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

ALDERSHOT GAS AND WATER COMPANY.

300 £10 "E" FIVE PER CENT. PREFERENCE SHARES.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Wednesday, April 26, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

CRAYS GAS COMPANY.

£2000 OF FIVE PER CENT. STOCK.

Ranking for a Standard Dividend of 5 per cent., subject to the Sliding-Scale; the last Dividend on similar Stock having been at this rate.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, April 26, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

WORTHING GASLIGHT AND COKE COMPANY.

300 £10 SHARES.

Ranking for a Standard Dividend of 7 per cent., subject to the Sliding-Scale, the last Dividend on similar Shares having been at this rate.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, April 26, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Trustees of the late Robert Higdon, Esq., the Administratrix of the late Mrs. S. A. Higdon, and other Owners.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

£2000 ORIGINAL ORDINARY CONSOLIDATED STOCK & £500 FIVE PER CENT. PERPETUAL DEBENTURE STOCK.

WEST HAM GAS COMPANY.

£900 OF FOUR PER CENT. PERPETUAL DEBENTURE STOCK, & 400 ORIGINAL SHARES, and

ILFORD GASLIGHT AND COKE COMPANY, LIMITED.

20 £5 FULLY-PAID "B" SHARES.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, April 26, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the Lowestoft Water and Gas Company, the Directors of the Southend Water-Works Company, and the Directors of the Enfield Gas Company.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Monday, May 8, at Two o'clock, in Lots:—

LOWESTOFT WATER AND GAS COMPANY—£6250 FOUR PER CENT. PERPETUAL DEBENTURE STOCK, and 132 £10 SHARES.

SOUTHEND WATER-WORKS COMPANY—500 £10 SHARES; and

ENFIELD GAS COMPANY—£3500 STOCK.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

TENDERS wanted for the supply of 2000 or 3000 Tons of OIL suitable for the manufacture of Carburetted Water Gas.

Particulars to be had from Mr. DAVID TERRACE, Manager, Gas-Works, MIDDLESBROUGH.

SKIPTON GAS COMPANY.

THE Directors of this Company are prepared to receive TENDERS for the supply of 7000 Tons of best screened GAS COAL, to be delivered as may be required during Twelve Months ending June 30, 1900.

Quotations to specify Price per ton, free on rails at Skipton, or delivered into the Company's Coal-Shed alongside the Canal.

Tenders, endorsed "Coal," to be sent to me not later than May 9 next.

No Forms of Tender issued.

The Directors will not be bound to accept the lowest or any Tender.

J. HAIGH,
Secretary.

April 13, 1899.

ASHFORD URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of 5000 Tons of GAS COAL, between the 1st of July, 1899, and the 30th of June, 1900.

Delivery to be at the Gas-Works S.E. Railway Siding, Ashford, Kent, or on Ship at loading port nearest to Colliery.

Forms of Tender and Information may be obtained on application (in writing only) from J. Morton, Manager, Gas-Works.

Tenders (endorsed "Coal") to be delivered, on or before Five p.m. on Friday, April 28, 1899, at my Office, 11, Bank Street, Ashford, Kent.

JOHN CREEBY,
Clerk.

By order of the Executors of the late W. J. Bryan, Esq.

GAS SHARES.

MR. GODFREY C. LAMBERT has received Instructions to SELL BY AUCTION at the Greyhound Hotel, High Street, Croydon, on Thursday, April 27, 1899, at Six o'clock precisely, in Lots, 25 SHARES of £10 each (£5 paid) of the ADDITIONAL CAPITAL of the MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY, producing Dividends at the rate of 7 per cent. per annum.

Particulars and Conditions of Sale may be had of GEORGE A. MARTIN, Esq., Solicitor, 31, BASINGHALL STREET, E.C.; at the PLACE OF SALE; and of the AUCTIONEER, 10, BASINGHALL STREET, E.C.

"GAS, AND HOW TO USE IT."

A useful little Brochure, suitable for Distribution among Gas Consumers in the District of any Gas Company, and containing

USEFUL HINTS TO GAS CONSUMERS, A COMPARISON OF INCANDESCENT BURNERS WITH ELECTRIC LIGHT, &c.

BY

J. H. TROUGHTON.

Sample Copies 6d. *each.*

100, £2; 250, £4 10s.; 500, £7 10s.; 1000, £10.

The Pamphlet can be specialized to suit the Price of Gas and other Conditions of supply in any particular District, at a slightly increased Charge.

Prices for larger quantities of the Publisher:

WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.

Prices are Reduced.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

W. H. PARKINSON,

THE HARTON COAL CO., LTD.,

NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON, NEWCASTLE."

THE Acetylene Illuminating Company, Limited, 63, Queen Victoria Street, London, E.C., GIVE NOTICE that they hold the BRITISH PATENT RIGHTS for the MANUFACTURE OF CALCIUM CARBIDE by means of the electric furnace, that they are bringing an action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from so manufacturing that product, and that they intend in the future to bring actions against all infringers of these Patents and all purchasers or users of Carbide of Calcium made in infringement of the same.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

THE READ-HOLLIDAY ACETYLENE COMPANY, LIMIT Acetylene Gas Engineers and Carbide of Calcium Manufacturers, HUDDERSFIELD.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

TINKER AND HOLLIDAY, LIMITED, Carbide of Calcium Manufacturers, HAZELHEAD, SHEFFIELD.

Price 6*s., Cloth Bound,*

THE CHEMISTRY OF ILLUMINATING GAS.

By N. H. HUMPHRYS, Assoc.M.Inst.C.E., F.C.S.

This work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas; Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation; Condensation; and Purification.

LONDON: Walter King, 11, Bolt Court, Fleet St., E.C.

Crown 4*to., Price* 3*s.* 6*d.*

GASHOLDER AND TANK

(Of One Million Cubic Feet Capacity)

AT THE

SUTTON GAS-WORKS.

Designed and carried out by

F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E.

MEMBER OF THE INSTITUTION OF GAS ENGINEERS,
MEMBER OF THE SOCIETY OF ARTS,
CONSULTING ENGINEER.

EMBRACING NOTES ON GASHOLDER CONSTRUCTION GENERALLY.

REPRINT OF A SERIES OF ARTICLES IN THE "JOURNAL OF GAS LIGHTING," &c., WITH THE ACCOMPANYING PLATES.

Other Works by the same Author.

The Guide-Framing of Gasholders, and Strains on other Structures in Gas-Works	**6s. 0d.**
Gasholders With or Without Guide-Framing: A Discussion; and Literature on Gasholder Construction	**1s. 0d.**
Flow of Gas, and Proportioning Gas-Mains	**7s. 6d.**

PUBLISHED BY

WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

TUBES AND FITTINGS

ALL KINDS

WRITE FOR PRICES

STAFFORDSHIRE TUBE Co., BIRMINGHAM.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH N.B.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD.

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

WELDON MUD

FOR

GAS PURIFICATION,

For use in the

RECOVERY OF SULPHUR,

ALSO

Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:

GAS DESULPHURIZATION CO.,

— LIMITED, —

1, FENCHURCH AVENUE, LONDON, E.C.

EVESON FOR CANNEL

TELEGRAMS: "EVESON, BIRMINGHAM."

BENZOL.

SPECIALLY prepared for Enriching Gas and PREVENTING THE STOPPAGE OF SERVICE-PIPES by the deposit of Naphthalene. Price 10d. per Gallon, free on rails at our Works in Drums (returnable).

Apply WHITWOOD CHEMICAL CO., Ltd., WHITWOOD COLLIERIES, Nr. NORMANTON.

COKE-BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT)

With Elevators and Conveyors worked by Steam or Gas Engine.

GEORGE WALLER & CO.,

165, QUEEN VICTORIA STREET, E.C.

And at STROUD, GLOUCESTERSHIRE.

INCANDESCENT GAS LIGHTING.

Incandescent Burners from **5/6 per doz.**

Specially annealed best Fireproof Glass Chimneys (equal to the Jena). 1/4 per Doz.

All other Incandescent Fittings at greatly reduced Prices.

Patentees of the "IMPROVED STANDARD GLOBE-CHIMNEY."

Best "Comet" Bulbs, 2/6 per Dozen.

Write for Illustrated Price Lists.

WHOLESALE FITTINGS COMPANY

80, COMMERCIAL ROAD, LONDON, E.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE

90, CANNON STREET, E.C.

THOMAS DUXBURY & CO.,

16, DEANSGATE, MANCHESTER.

GAS ENGINEERS' AGENTS AND CONTRACTORS FOR

Meters, Fire-Clay Goods, Oxide of Iron, and all other Gas Apparatus. Retort Carbon purchased.

Inquiries Solicited.

Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

ENRICH YOUR GAS

WITH

CHEAP BENZOL.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER & CO., MIDDLESBROUGH.

DISPENSE WITH CANNEL COAL

and

INCREASE YOUR ILLUMINATING POWER

by using the

WHESSOE-MUNICH BENZOL CARBURETTER

The Cheapest and Best in the Market.

The Managers of Tynemouth, Middlesbrough, and Darlington Gas-Works are much pleased with it, and would not be without it.

Apply to the Sole Makers

THE WHESSOE FOUNDRY COMPANY, LIMITED, DARLINGTON.

HEBBURN MAIN GAS COALS.

Yield of Gas per Ton . .	10,500 Cubic Feet.
Illuminating Power . . .	16·4 Candles.
Coke	68 per Cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

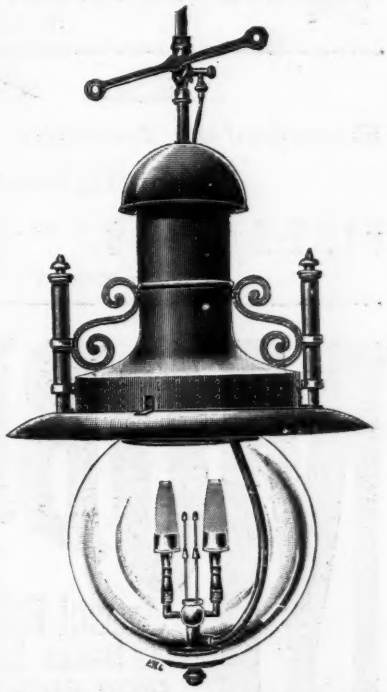
The Wallsend & Hebburn Coal Company, Ltd.

Bl Lombard Street, NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

THE PATENT

"BEACON" GLOBE LAMP.



As fitted up at London Bridge Railways' Approach, and Kennington Park, S.E.

H. GREENE & SONS, Ld.,

Late of Cannon Street,

19, FARRINGDON RD., E.C.

Telegrams: "LUMINOSITY, LONDON."

GREAT FIRE IN FARRINGDON ROAD.

H. GREENE & SONS, LTD.,

Have a large and varied Stock of

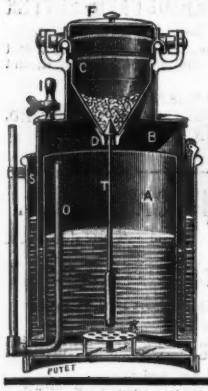
LAMPS, CONSUMERS' FITTINGS, &c., SMOKE DAMAGED ONLY,

To be disposed of at **Greatly Reduced Prices.**

19, FARRINGDON ROAD, E.C.

Telephone 1215, HOLBORN. Telegrams: "LUMINOSITY, LONDON."

THE LIGHT OF THE FUTURE



THE STRONGEST AND MOST BEAUTIFUL LIGHT KNOWED.

ABSOLUTELY HARMLESS.

ACETYLITE Ltd., 400, New John St. West, Birmingham.

THE ONLY SYSTEM OF GENERATING PURE ACETYLENE GAS.

Installations for Private Houses, Streets, Works, Railway Stations, Carriages, &c.

ESTIMATES AND CATALOGUES SENT ON APPLICATION.

National Telephone: No. 2481. Telegrams: "GENERATOR, BIRMINGHAM."

HARRIS & PEARSON,

STOURBRIDGE, ENGLAND,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

G. & J. HAIGH,

Raven's Lodge Fire-Brick Works, DEWSBURY.

Manufacturers of MACHINE-MADE RETORTS and

FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for **GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.**

For Prices and Analysis, apply as above.

MOBBERLEY & PERRY STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.

EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

London Agents: Contractors for the erection of Retort-Benches complete.

BALE & HARDY, Gas Engineers and Contractors, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

THE

SUNLIGHT

INCANDESCENT GAS-BURNER

NEW POPULAR PRICES.

Burners, complete with Mantle, Chimney, and Peg, from 2/10 each.

Burners, " " " with Bye-Pass, from 4/6 each.

Mantles, Sunlight Tinted, Natural in light, Soft in tone . 9/- per doz.

Mantles, " White, just put on the Market . . 12/- per doz.

SPECIAL NOTICE!!!

Sunlight WHITE Mantles

are NOT Infringements of Welsbach or any other Patent, but are made under a Series of independent Patents, and by an entirely New Process.

We give you an absolute indemnity against all loss, damage, or expense. If, therefore, there is any attempted molestation, do not be intimidated, but communicate at once, at OUR Expense, with our Solicitor, Mr. Hugh C. Godfray, 42, Finsbury Square, London, E.C., who will immediately relieve you of all responsibility and trouble in the matter.

BRANCHES AND AGENCIES EVERYWHERE.

Price Lists, &c., on application.

THE

NEW INCANDESCENT (SUNLIGHT PATENT) GAS LIGHTING CO., LIMITED,

33 & 34, SHOE LANE, LONDON.

Telegrams: "IGNIFLUOUS." Telephone No. 947 Holborn.

A.B.C. Code used.

HISLOP'S PATENT REGENERATIVE RETORT-SETTINGS

These Settings are Testified to and guaranteed to produce **more Gas per day,** to be more **simple** in **Management,** to have **greater Durability,** to be **more Economical** in **Labour** and **Fuel,** and to have the **Lowest Cost for Renewals** of any system in the Market. Gas Engineers and Managers would do well to give these advantages their careful consideration, when contemplating extension of their Retort-Benches, or when filling existing Ovens.

Further Particulars from the Principal Agent, or from C. M. HAMILTON, Retort Builder, Hamilton, Agent for Scotland & Ireland.

NOTE: **The Agency held by Messrs. Drake & Son, Halifax, for England, Wales, and Abroad has now ceased; and they have no authority whatever to represent the Patentee, although persistently advertising themselves as Agents.**

All Enquiries to be addressed to R. F. HISLOP, Gas Engineer, CRAIGIELEA, PAISLEY.

SAWER & PURVES, NELSON METER WORKS, MILES PLATTING, MANCHESTER,

(BRANCH OF METERS LIMITED),

MANUFACTURERS OF

IMPROVED WET GAS-METERS IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

IMPROVED DRY GAS-METERS.

Speciality: PATENT CASH PREPAYMENT METERS.

CATALOGUE SENT ON APPLICATION.

HANNA, DONALD, & WILSON,

(Established 1851),

GAS ENGINEERS & CONTRACTORS,

Abercorn Foundry and Abbey Works,

PAISLEY, N.B.,

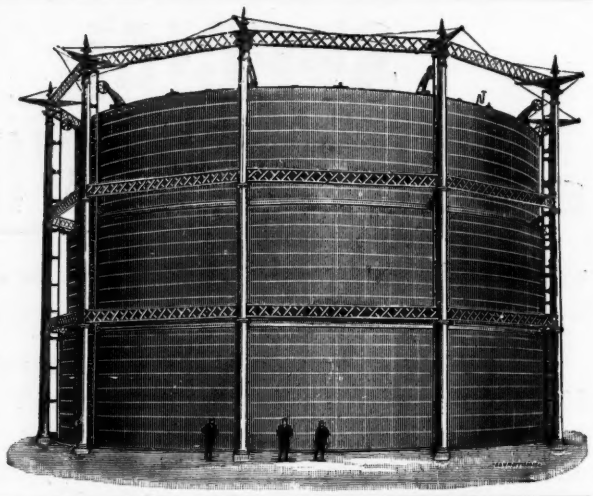
MAKERS OF

Gasholders and Gas Plant

OF EVERY DESCRIPTION.

Sole Agents for Scotland for the Automatic Coal-Gas Retort (Inclined System) Company, Limited.

Telegraphic Address: "Donald, Paisley."



MAURICE GRAHAM, Managing-Director.

Telegrams: "ACCOUPLE, LEEDS."

GRAHAM, MORTON, & CO.

— LIMITED —

INCLINED RETORTS

AND ALL CLASSES OF

ELEVATING & CONVEYING MACHINERY

— Contractors to Her Majesty's Government. —

LEEDS.

CAUTION! CAUTION! CAUTION!

INCANDESCENT GAS LIGHTING.

ALL DEALERS AND THE PUBLIC ARE

CAUTIONED AGAINST BUYING, SELLING, OR USING

EITHER OF THE FOLLOWING MANTLES:—

"SUNLIGHT" COMPANY'S WHITE MANTLES.

"DAYLIGHT" COMPANY'S WHITE MANTLES.

ACTIONS FOR INFRINGEMENT OF PATENT HAVE BEEN COMMENCED by the WELSBACH INCANDESCENT GAS-LIGHT COMPANY, Ltd., against both the above Companies for Infringement of Patent by the **MANUFACTURE AND SALE** of the above White Mantles.

USERS ARE EQUALLY LIABLE WITH DEALERS.

THE WELSBACH INCANDESCENT GAS-LIGHT CO., LD., YORK ST., WESTMINSTER.

D. HULETT & CO., LTD.

55 & 56, High Holborn, London.

GAS SERVICE CLEANSERS.

LAMP TORCHES.

DRY GAS-METER MAKERS.

WROUGHT-IRON TUBES & FITTINGS.

STREET LAMPS & POSTS.

PRICE LISTS ON APPLICATION.

H. KIRKHAM'S PATENT "IMPERIAL" WASHER-SCRUBBER.

TESTIMONIAL.

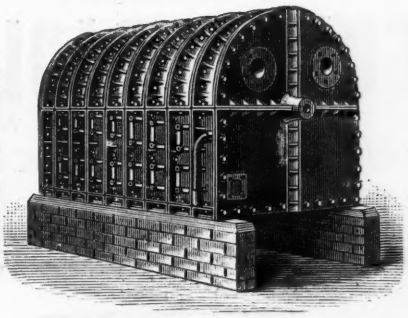
The Dover Gaslight Company,
Gas-Works, Buckland,
Dover, Feb. 8, 1899.

H. KIRKHAM, Esq.

Dear Sir,—Have now made further tests with the Washer fitted with your PATENT WASHING DEVICES, and have much pleasure in reporting that *the results were highly satisfactory*; also, I ascertained that the maximum results were obtained when the machine was working at three revolutions per minute. At this speed 13 to 14 gallons of water per ton of coal carbonized were converted into 10-oz. Ammoniacal Liquor, and at same time the Gas was free from Ammonia.

Should you wish further details, I will forward them.

I am, dear Sir, yours truly,
RAPHAEL HERRING, Engineer.



EFFICIENCY GUARANTEED.

Estimates given for a complete set of Segments for one wheel, or for refitting the whole number of wheels in a machine, also for Washer-Scrubbers complete.

The Scrubbing Devices are metal scrolls fixed in cages of segmental form, which can be readily and successively removed from the wheels through a manhole on the top or side of the machine, and the enclosed Scrubbing Devices taken out, cleaned, and replaced without the delay that necessarily takes place when the entire scrubbing material of the whole wheel has to be dealt with in one operation—thus effecting an important saving in time and labour. These Cages can be applied to the wheels of any machines of the type shown, and will increase their efficiency above 20 per cent.

The Scrubbing Devices are unequalled for extracting the whole of the Ammonia and a very large proportion of the Carbonic Acid and Sulphuretted Hydrogen from the Gas; and, if required, the strength of the Ammoniacal Liquor can be worked up to 30 oz. and above, which greatly reduces the quantity of Oxide or Lime, and also the amount of Labour for Purification.

OFFICE: 25, Victoria Street, Westminster, LONDON, S.W.

OIL FOR GAS MAKING

PURE DISTILLATE.

HOMOGENEOUS IN CHARACTER.

NO MIXTURE.

CAN BE STORED SAFELY ANYWHERE.

FLASH POINT GUARANTEED OVER 200° FAHR.

(ABEL'S CLOSED TEST.)

ANGLO-CAUCASIAN OIL COMPANY, LTD.

8, 9, 10, & 11, LIME STREET, LONDON, E.C. | INDIA BUILDINGS, CROSS ST., MANCHESTER.

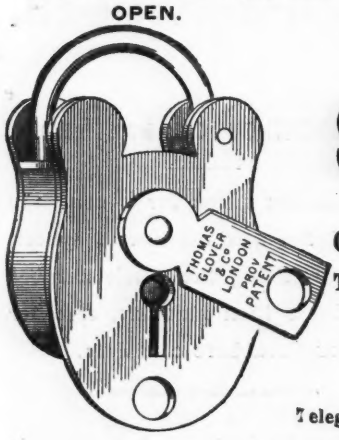
ESTABLISHED 1844. **ORIGINAL MAKERS.** ESTABLISHED 1844.

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

OPEN.



THOMAS GLOVER & CO.'S

PATENT

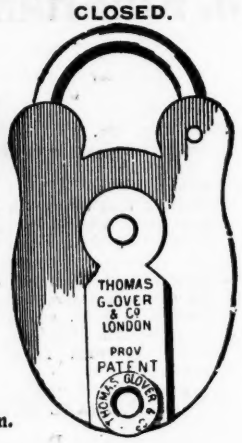
SECURE PADLOCK

PREVENTS TAMPERING WITH THE

CASH-BOXES OF PREPAYMENT METERS.

The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

CLOSED.



Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 28, BATH STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 1008.

BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address:* "GOTHIC."

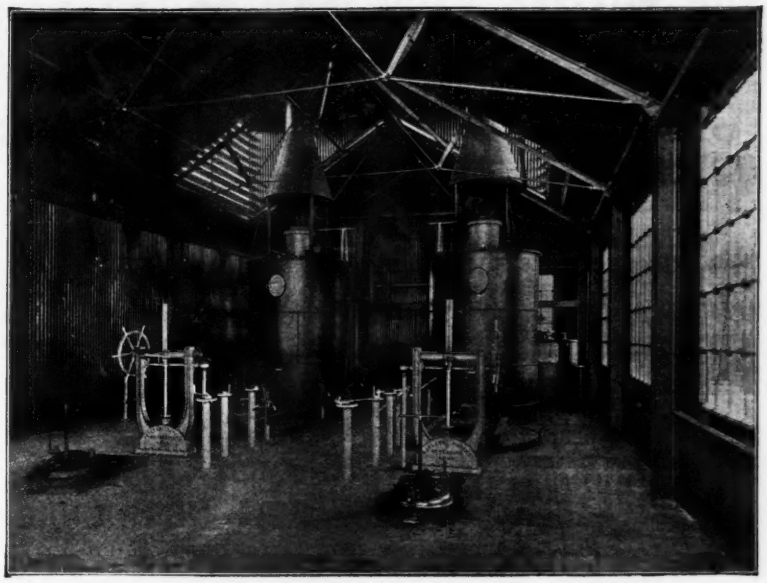
MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 3396.

GLASGOW: ARGYLE WORKS, KINNING PARK. *Telegraphic Address:* "GASMAIN." Telephone No. 1525 South Side.

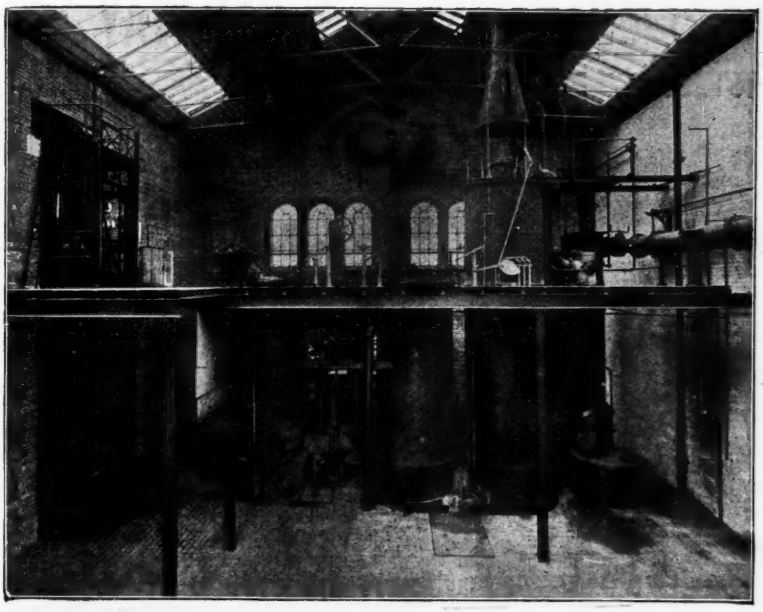
S. Cutler & Sons,
Millwall, London.

GASHOLDERS.

CARBURETTED WATER-GAS PLANT.



Water-Gas Plant at Southall.



Water-Gas Plant at Folkestone

Carburetted Water-Gas Installations.

HORNSEY.
HASTINGS.
BUENOS AYRES.
SOUTHEND.
PLYMOUTH.
SOUTHALL.
HARROW.
HORSHAM.
FOLKESTONE.
BEXHILL.
SOUTHEND (2nd Order).
PLYMOUTH (2nd Order).
SOUTHALL (2nd Order).
FOLKESTONE (2nd Order).

CUTLER'S PATENT GUIDE-FRAMING FOR GASHOLDERS

ADOPTED FOR
MANY IMPORTANT
GASHOLDERS.

OIL-TANKS.

EVERY DESCRIPTION OF GAS-WORKS APPARATUS.

Water-Gas Plant at Southend.

THE THAMES BANK IRON CO.

UPPER GROUND STREET, LONDON, S.E.,

SUPPLY FROM STOCK

CAST-IRON RETORTS

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

Sole Manufacturers of LYON'S "PATENT" GAS-MAIN SYPHONS.

AGENTS FOR

ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,

WORTLEY FIRE-CLAY WORKS.

Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.

JAMES MILNE & SON, LTD.,

GAS ENGINEERS,

MILTON HOUSE WORKS EDINBURGH.

LONDON. —— LEEDS. —— GLASGOW.

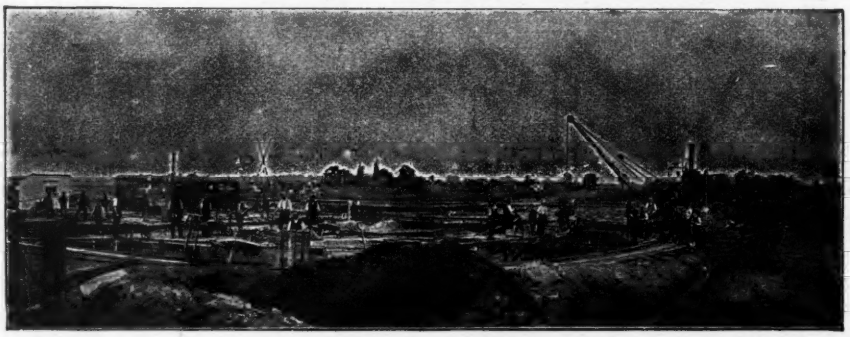
GASHOLDER TANK, EMBANKMENT, & RAILWAY

Telegrams: "Robustness, London."

UNDER CONSTRUCTION BY OUR OWN WORKMEN.

Telephone No. 756 Bank.

RESERVOIRS, TRIAL BOREHOLES and WELLS. MAIN and SERVICE LAYING.



COMPLETE GAS and WATER WORKS ERECTED and SET to WORK including ALL MAINS.

J. & H. ROBUS, Engineering Contractors,

20, BUCKLERSBURY, LONDON, E.C.

For Carbonizing Advt. see last Issue.

LONDON OFFICE

60 QUEEN VICTORIA ST. E.C.

TELEGRAPHIC ADDRESSES "DRAKESON HALIFAX." "ECLAIRAGE LONDON."

TELEPHONE Nº 43. "HALIFAX EXCHANGE"

GAS ENGINEERS. CONTRACTORS. IRONFOUNDERS.

RETORT SETTERS. FURNACE BUILDERS. ETC. ETC.

JONAS DRAKE & SON

SOLE AGENTS FOR

HISLOP'S

PATENT REGENERATIVE FURNACES

—FOR—

ENGLAND, WALES & ABROAD.

RETORT BENCHES ERECTED COMPLETE WITH OR WITHOUT SPECIAL FURNACES.

RESULTS GUARANTEED.

OVENDEN HALIFAX

Designs and Estimates on Application.

GASEOUS FIRING A SPECIALTY.

IMPROVED GAS GOVERNOR.

(Patent applied for.)

The Inlet Pressure having absolutely no effect on the open-ended cylindrical Valve, the pressure is maintained constant at the outlet **UNDER ANY CHANGE OF PRESSURE OR DRAUGHT**, and dispenses with the usual complicated balancing arrangements.

Provided with a most **SIMPLE** and **CONVENIENT METHOD** of **WATER LOADING** and **WITHDRAWAL** without syphons or other complications, or with weights to adjust pressure as desired.

WILLEY & CO.,

GAS ENGINEERS, IRONFOUNDERS, & CONTRACTORS.

Manufacturers of Gasholders, Purifiers, and every description of Gas and Water-Gas Plant of any capacity. Station Meters, Wet and Dry Consumers' Meters, Prepayment Meters, Gas Apparatus and Gas Fittings. Also Bridges, Roofs, Columns, Girders, and Structural Iron and Steel Work of all kinds.

CHIEF OFFICES AND WORKS } **ST. THOMAS, EXETER.** Telegrams: "WILLEY, EXETER." Telephone: 132 and 263.

Meter-Works: { 32a, Hertford Road, De Beauvoir Town, LONDON, N.; & James Street, EXETER. | Offices and Depots: { CARDIFF: Prudential Buildings, St. Mary Street. MANCHESTER: Victoria Buildings.

PLYMOUTH, DEVONPORT, SWANSEA, & NEWPORT.

BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
Established 1860.

WILSON CARTER & PEARSON,
GAS COAL AND CANNEL FACTORS,
Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.
ADDRESS CHIEF OFFICES:
Temple Buildings, 50, New Street, Birmingham.

THOMAS BUGDEN,
Manufacturer of

Bellows for Inflating Gas-Bags. Made in various sizes.

Bellows made to inflate a 48-inch Bag under One Minute.

Miners' Woollen Jackets.

India-rubber Hose, Sheet, and Washers of every description, Leather Bands, Oils, &c., Diving and Wading Dresses, Waterproof Coats, Capes, and Sewer Boots.

Stokers' Mitts, from 14s. doz.

Special Air Tubing made for Gas Companies.

Gas-Bags for Mains.

71, GOSWELL ROAD E.C., AND AT
256, PENTONVILLE ROAD, KING'S CROSS, N.

ARROL-FOULIS
Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,
SIR WILLIAM ARROL & CO., Limited,
GLASGOW.
[See Illustrated Advertisement, April 4, p. 842.]

PETTIGREW'S PATENT
Sulphate of Ammonia Plant
ON THE CONTINUOUS SYSTEM
Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.
Old Systems easily and cheaply converted.
ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.
Makers of Self-Emptying Saturators.
Write for Particulars, Testimonials, and References to
GEO. PETTIGREW & Co.,
GAS AND CHEMICAL ENGINEERS,
MIDDLESBROUGH-ON-TEES.

THE
DENAYROUZE
LIGHT SYNDICATE,
THE
PIONEERS OF NO CHIMNEYS,

still hold their own on the market for the

HIGHEST CANDLE POWER

for each Cubic Foot of Gas at ordinary Pressures.

The Syndicate's Three-Light Cluster, governed to consume only 24 Cubic Feet of Gas per Hour, gives

550-CANDLE POWER,

which speaks for itself.

The Syndicate works under the

BANDSEPT PATENTS;

and Bandsept, who was the first to adopt the Injector Principle, is

STILL AHEAD OF ALL RIVALS;

and the combination of his Burners with Welsbach Mantles can be fearlessly tested against any others

ON THE MARKET.

Call and see these Burners.
AT THE
OFFICES OF THE SYNDICATE,
28, VICTORIA STREET, S.W.
CHARLES EDWARD MASTERMAN,
General Manager.

HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.

Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.

Manufacturers of Glasshouse Pots and Crucibles of every kind.
Established 1836.

JOSEPH CLIFF & SONS,

INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.

WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:

Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N.
GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

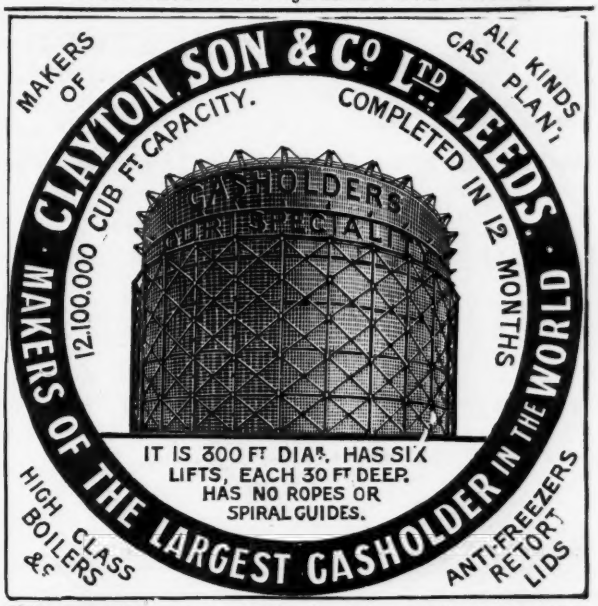
RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

MACKRELL BROS.,
Buslingthorpe Lane, LEEDS,

Manufacturers of

IMPROVED GAS-METER PERSIANS.

UNSURPASSED FOR QUALITY AND VALUE.


MAKERS OF
CLAYTON, SON & Co LTD LEEDS
ALL KINDS GAS PLANT
12,100,000 CUB FT CAPACITY.
COMPLETED IN 12 MONTHS
GASHOLDERS
SPECIALITY
IT IS 300 FT DIAM. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
HIGH CLASS BOILERS &c
ANTI-FREEZERS RETORT LIDS

GIRDERS, ROOFS, & ALL KINDS OF STRUCTURAL IRONWORK.

London Office: 60, QUEEN VICTORIA STREET, E.C.
Telegraphic Addresses: "GAS, LEEDS." "ECLARAGE LONDON."

R. & J. DEMPSTER, LTD., MANCHESTER.

Telegraphic Address: "SCRUBBER, MANCHESTER."
National Telephone: Nos. 54 and 2296.

London Office: 165, GRESHAM HOUSE,
OLD BROAD STREET, E.C.

View of Top of Retort-Bench, containing 484 Mouthpieces, showing Arch and Dip Pipes, Hydraulic and Foul Mains, &c., erected by R. & J. D., Ltd., at the Bradford Road Gas-Works of the Manchester Corporation.

W. PARKINSON & CO.

SQUARE STATION METERS.

All the Meters (which number 15) at the Beckton Station of THE GASLIGHT AND COKE COMPANY have been erected by the above Firm.

PARKINSON'S PATENT EQUILIBRIUM GOVERNORS.

A very large number are now at work; and all Engineers who have adopted them speak in unqualified terms of their great efficiency.

COUNTERBALANCE or AIR VESSEL, as desired.

FITTED WITH SIX COLUMNS and GIRDERS, WEIGHTS or WATER PRESSURE.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegrams: "INDEX."
Telephone No. 778 King's Cross.

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegrams: "GASMETERS."
Telephone No. 1101.

[See also Advt. p. 962.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, April 18, 1899.